1900   1930

TYPHOID FEVER

ENTERITIS,
under 2 years

DIPTHERIA

MEASLES, S.F. &

POPULATION	1,293,697	**1900**
DEATHS	26,975	

POPULATION	1,954,063	**'30**
DEATHS	24,541	

	1900	1930
MORTALITY RATE per 1000	20.9	12.56

1900	1930

Graphic comparison of the mortality rates for Philadelphia during the years 1900 and 1930.

INTERNATIONAL CLINICS

A QUARTERLY

OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIAT-
RICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS,
PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY,
OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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Clinical Papers from the Department of Medicine, Tulane University, New Orleans

ON THE PRESENT STATUS OF THE POSTOPERATIVE PNEUMOPATHIES ·

A Cursory Review of the Question*

By RUDOLPH MATAS, M.D., LL.D., F.A.C.S.

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Medical School, Tulane University, New Orleans, Louisiana

INTRODUCTORY

On the Need of Better Statistics of Postoperative Morbidity and Mortality.—One of the most notable and significant features of the surgery of our day is the widespread interest and extraordinary activity displayed in the investigation of the causes of postoperative morbidity and mortality.

There was a time, not far remote, when the mere survival of a patient from a capital operation was, in itself, a satisfactory triumph. Whatever complications occurred that were not directly the result of the operation (shock, hemorrhage and sepsis) were regarded as unavoidable evils for which the surgeon disclaimed all responsibility. Now the attitude of the surgeon has completely changed. Since the hospitalization of surgical patients has become the rule in general practice, new standards of surgical efficiency have been evolved which had never been thought of when surgery was done in private homes and when an adequate basis for statistical comparison of surgical results was not available.

The American College of Surgeons, when it undertook its mission, and particularly the propaganda for hospital standardization, twenty-seven years ago, realized from the moment of its organization

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that the greatest hope of reducing surgical mortality rested on the constant and critical discussion of the causes of surgical and post-operative deaths in hospitals, and made the periodic and systematic analysis of the postoperative deaths one of the prime and obligate functions of the staff organization in all the approved hospitals.

That the stress laid by the College on this feature of the regular hospital staff meetings has borne fruit is evident in the improvement of the clinical records in the approved hospitals, especially in regard to the statistical information bearing on the end-results of operations and surgical treatment, on the causes of death and on the postoperative complications which have furnished the material for the many admirable contributions on this subject that have appeared in the current literature during the last few years.

However, it must be admitted that, despite the great improvement in hospital records in recent years, these, as a whole, are still deficient and defective for statistical purposes, especially in regard to the incidence of the postoperative complications, the end-results, and in the correlation of the clinical diagnoses with the postmortem findings in fatal cases. This is particularly true of the statistical study of the *postoperative pulmonary complications* which are the subject of the present discussion. Here we find that all attempts at even approximate estimations of postoperative morbidity are thwarted by lack of concerted action and agreement on nomenclature on the part of the staff, the failure in most hospitals to record the minor complications in the non-fatal cases, in the diversity of interpretations given to common pathologic states by different members of the hospital staff, and by the lack of postmortem evidence to confirm or disprove the clinical diagnosis in the majority of the fatal cases.

The low average percentage of autopsies to deaths which, with a few notable exceptions, characterize the records of most of the hospitals of this country—at least until quite recently—finds no exception, I am sorry to say, here in our own city, where, until two years ago, the autopsies in our leading public and private institutions did not exceed 13 to 14 per cent. of the deaths.

I am pleased to state that the postmortem rate in the last year in Touro Infirmary has improved to the extent of 30 to 35 per cent., and at the Charity Hospital, according to Doctor D'Aunoy, patholo-

gist, the rate was increased in the period 1929–1930, from 12 or 13 per cent. to 20 and 22 per cent.

Without entering into a discussion of the many well-known reasons for this low percentage of postmortems, it is evident that this fact alone puts us at great statistical and scientific disadvantage in the study of postoperative morbidity and mortality, when compared with some of the hospitals in this country and in Europe, particularly in Germany, where the autopsy rate averages from 80 to 90 per cent. of the deaths in all state institutions and where the authority to perform autopsies is exercised as a state right, and not as a concession obtained solely by permission, as with us, except in coroners' cases.

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The difficulties encountered in attempting statistical inquiries into the relative incidence of the more frequent postoperative complications are well illustrated by the inextricable confusion that arises when we consult the old hospital records of the postoperative *pulmonary* complications and contrast these with our present experience and changing concept of their incidence, etiology and pathology.

A careful investigation of the records of the Charity Hospital and of other long-established institutions—such as the Touro Infirmary, with which I am most familiar—shows that the vast majority of the clinical records, even those of recent date, refer to these complications almost exclusively as "pneumonia," "bronchitis," or "pleurisy," with such diagnostic variations as bronchopneumonia, pleuropneumonia, lobular or lobar pneumonia, but, more often, simply as "pneumonia." Rarely do we find any systematic effort at differentiation between the purely infectious, inflammatory and the embolic- or infarct-pneumonias, and, much less, any mention of atelectasis, which, of course, has only recently come into existence in hospital statistics as a postoperative pulmonary complication.

This lack of differentiation of the pneumonic lesions in the older statistics is easily accounted for when we realize that it is only since the expansion of surgery and the vast multiplication of operations in the last three decades, especially the abdominal, that the pul-

monary complications have made their appearance as definite factors of postoperative morbidity and mortality.

The truth of the matter is, that we are now in a state of transition between the old and the new, between the older pathogeny which visualized the pneumonic complications solely from the gross anatomical and clinical viewpoint, and the new, in which the resources of the pathologic, bacteriologic and the X-ray laboratories have combined to aid the clinician in obtaining a far more certain and accurate differential diagnosis at the bedside, and simplified the task of the pathologist in his analysis of causes in the laboratory.

This knowledge, however, though much advanced by recent research, is still in the making and is too recent to justify any dogmatic or definite conclusions as to pathogenesis of the postoperative pulmonary complications, especially when based upon any exclusive theory of their causation.

The Relation of Anesthesia to the Postoperative Complications.— Until the beginning of the present century, practically all the postoperative pulmonary complications, with the exception of the sudden deaths caused by massive embolisms of the pulmonary artery, were attributed primarily to the direct or indirect effect of the inhalation anesthetics, particularly ether and chloroform. It is only since the introduction of local and regional anesthesia that it has become quite apparent that postoperative pneumonias occur independently of general narcosis and that the inhalation anesthetics are not exclusively or even largely responsible for these complications, as at one time believed.

It cannot be denied, however, that despite the vast improvement in the anesthetic agents and in the technic of their administration, the anesthetic gases cannot be altogether eliminated from the etiology of the postoperative pulmonary complication. Whether by acting directly as irritants to the bronchi and pulmonary parenchyma, or indirectly, by favoring the aspiration of septic material, or again, by diminishing the resistance of the lungs to infection—anesthetic gases still play a part in the etiology of these complications, even when the gases are administered by the most skilful anesthetists (McKesson, Lundy, Gwathmey, Featherstone, *et als.*)

It is the recognition of this fact that has stimulated the development of local and regional methods of analgesia, especially the spinal

and splanchnic, in recent years and that is now encouraging the discovery of other analgesic drugs as we see in the use of intravenous methods with new synthetic (barbituric) compounds, and rectal anesthesia, by avertin, *etc.*

The remarkable records of Finsterer (Vienna, 1922–1930), Judine (Moskow, 1931), Holmann, Metge, Potoschnig, Puccinelli and others, who appear to have eliminated the pulmonary complications from abdominal operations, and especially the subdiaphragmatic, which are more liable to these complications (resections of the stomach for cancer, for simple peptic, duodenal, jejunal and perforating ulcer, and cholecystectomies) by resorting to *splanchnic* anesthesia to the exclusion of all forms of inhalation narcosis, and the claims of relative immunity from pulmonary complications made recently for spinal anesthesia by many surgeons (Forgue and Basset, Gouillioud, Gregoire, Reinhard, Fasiani, Anzilloti, Solieri, *et als.*) —all confirm the belief that the inhalation anesthetics are not altogether blameless in the etiology of the postoperative pneumopathics.

Puccinelli, Rome, 1929 (*Trans. Thirty-sixth Congress Ital. Surg. Soc.,* October, 1929; *Clinica Chirurgica,* p. 1767, December, 1929), on the basis of statistics and personal observations, contends that the postoperative pulmonary complications have almost completely disappeared in his hospital under local or regional anesthetic methods; the mortality of these complications has been lowered to 1/2 of 1 per cent., whereas the patients operated upon under general narcosis showed a mortality of 5 per cent. The same views are expressed even more emphatically by the authors just quoted.

By the side of these exceptional experiences, we could quote a mass of statistics from practically every large clinic in this country and abroad to show that the pulmonary complications, particularly the massive emboli and late embolic infarctions, or so-called infarct-pneumonias, occur after all forms of local and regional anesthesia, almost as frequently in abdominal cases, as after general inhalation narcosis. Such is the conclusion that must follow a consideration of the evidence furnished not only by the earlier statistics of Gottstein (1901), Henle, Mikulicz, Mandl and others, but by the more recent statistics of Cuttler, Wharton, Whipple, Cleveland, Elwyn, Featherstone, DeQuervain, Payr, Chiasserini and my own experience. As the result of this cumulative and recent experience, we

may safely assert that as far as embolism and pulmonary infarctions are concerned, the inhalation anesthetics are not responsible for the postoperative pneumopathies; but that the inhalation anesthetics predispose to pneumonic infections and probably to atelectatic consolidations, especially in individuals sensitized to their irritant and toxic action by preëxisting pulmonary disease, cannot be doubted.

The Postoperative Pulmonary Complications or Pneumopathies. This term is used in a generic sense to embrace a variety of pathologic states or lesions in which infection, embolism and atelectasis are the underlying causative factors.

As a relic of tradition these diverse pulmonary states are still collectively referred to as pneumonia or pneumonitis, which always suggests a primary infection and an inflammatory disorder, not in accord with their variable pathogeny. With the French authors, I prefer the term "postoperative pneumopathy" as a collective or generic designation. This term has the advantage that it does not commit the clinician to a specific or exclusive pathology, but merely indicates that there is a pulmonary lesion or state ("pathy") which may be a specific, inflammatory pneumonic infection, an embolic or mechanical obstructive infarction, an atelectatic consolidation, or a combination of all three.

Classification of the Postoperative Pneumopathies.—These may be classed as acute or precocious, late and chronic complications.

In this discussion, we will confine our remarks chiefly to the acute complications, which occur within the first five days or a week of the operation; because it is these that are alone involved in controversy as to their true origin and nature.

They embrace the following:

1. *Bronchitis and bronchorrhea,* including the traditional "ether bronchitis," "ether pneumonia," the *"narcose pneumonie"* of Lichtenberg and the German authors, "aspiration pneumonia," "deglutitional pneumonia" (the so-called *"Schluck pneumonie"* of Biebergeil).

2. "Pulmonary congestion"—a very indefinite term, originally intended to mean a hyperemia of the lung which might be active in the acute stage of an infection, or passive (venous stasis) in the terminal stages of the infection. At present, the term "congestion"

refers to a manifestation that is revealed more often radiologically than clinically, as an interpretation of the flitting and transitory shadows that appear in X-ray films in the first few hours after a high epigastric laparotomy in man, and in experimental animals. These shadows may appear in a few hours or days, leaving no trace behind them, or they may remain and merge with the more definite radiologic and physical signs of a lobular or massive atelectasis, or with those of a lobular or bronchopneumonia. Bianchi, of Genoa (1929–1930), who has made a special study of the radiologic image of the lungs after high laparotomies (gastric and biliary surgery in 173 operated patients observed with portable bedside X-ray apparatus), says that in laparotomized patients in the upper belt, there is always a diminished expansion of the lungs, especially at the bases, and flitting shadows of variable density which appear at both bases, but more often in the right. These functional and radiologic appearances are present only in laparotomized patients and not in patients operated upon in other parts, such as the head and extremities. These shadows he would attribute to patches of atelectatic condensation or apneumatosis.

The radiologic shadows and diminished lung expansion and reduced vital capacity are common to all cases of high laparotomies, whether they follow a perfectly normal course, or develop extensive atelectatic or bronchopneumonic complications, depending upon reflex inhibitations from painful stretching of the wound, and "splinting" of the abdominal muscles. In clinically normal, uncomplicated cases, the shadows disappear in a few hours, or as soon as the respiratory rhythm and diaphragmatic respiration improve.

This view also finds support in C. R. Metcalf's recent studies of the postoperative pulmonary complications at the Massachusetts General Hospital. He finds radiologic signs of partial or lobular atelectasis without any physical signs or symptoms to indicate it, especially when looking for radiologic signs after laparotomies.

D. H. Patey, in his recent experimental study (London, 1930), of "the effect of abdominal operations on the mechanism of respiration, with special reference to embolism and massive collapse of the lung," found in a limited radiologic study of laparotomized patients that "a certain deficiency of the expansion of the lung bases and a certain amount of venous stasis (areas of opacity) occur after, as

compared with before, the operation." Like Bianchi and other observers he notices diminished excursions of the diaphragm with a reduced vital capacity, tidal air, *etc.* He concludes that "any effect that respiratory subefficiency might have in this connection is of a subsidiary or predisposing nature *only*, and other factors of an exciting nature are necessary for the development of definite complications." In no case did embolism, atelectasis or pneumonia follow these early radiologic or physiologic changes.

Reverting again to the diagnosis of "congestion of the lungs" as a complication, we would say that there are two types of this venous stasis that occurs after subdiaphragmatic laparotomy, that condition: (a) Precocious hyperemia of the lung bases, probably a is interpreted as the result of diaphragmatic inhibition and secondary stasis of the lung bases. As previously stated, this is common to all high laparotomies and as a constant, but transitory, phenomenon it plays no serious part in the prognosis unless it be a precursor to more permanent changes. (b) The second type of congestion is a late complication which also appears at the lung bases (bilateral) as the result of a general exhaustion, cardiovascular asthenia, vasomotor paresis with passive (gravity) congestion and edema of the bases. This is the classical "hypostatic" pneumonia of aged and exhausted subjects which appears as a *terminal phenomenon* in fatal abdominal and other operations.

3. *An atypical, mild, or abortive form of lobular or bronchopneumonia* which was originally described by Whipple (1914) as a lobular "pneumonitis" and which he etiologically identified with pneumococcus type IV. This, as we shall see later, is regarded by Whipple as the typical and most frequent of the postoperative pulmonary complications.

4. *The classical, lobar or croupous pneumonia bacteriologically associated with pneumococcus types I, II, III,* which are much more virulent than type IV, and are always associated with a graver prognosis. This classical type of pneumonia runs a definite course and ends by crisis, and is universally regarded by all investigators as a serious but fortunately *very rare* postoperative complication.

It is well to remember in connection with the pneumonias that the surgical patient is liable to contract any epidemic disease that may be prevailing at the time when the operation is performed. This

is particularly true of the risk incurred by laparotomized patients in grippal epidemics in which complicating pneumonias of a grave type are likely to occur. In fact, this liability is so well recognized that many surgeons of experience (Whipple, Daly, Faure, Nelz, Sellheim, Rost, Beada, et als.), prefer to postpone all operative interventions, especially in abdominal cases, whenever influenza is prevailing as an epidemic. Pulmonary complications contracted in the course of epidemics are merely accidental or intercurrent events which are not peculiar to the postoperative state, or that depend upon conditions inherent in the patient or the operation.

5. *Emboli and Embolic Pulmonary Obstructions Leading to Infarction and Pleuro-pneumonias.*—The conditions which determine the type of pathologic lesions in the lungs after embolism are: the size of the embolus, the condition of the pulmonary circulation, the presence of infection either in the lung or in the embolus, and the position of the artery which is obstructed. Of these, the most important consideration is the first, for whether the patient is subjected to only a few days' inconvenience or dies suddenly depends largely upon the size of the embolus.

The embolic complications may be subdivided with Wharton and Pierson (1922) into the following three groups: (a) Grave, massive pulmonary embolism, due to large emboli causing more or less complete occlusion of the main artery or its primary branches, cutting off the circulation of more than one lobe and causing quick or immediate death; or when the obstruction is partial, producing widespread pulmonary edema, hemorrhagic consolidation of the lung tissue involved. Fortunately, this is a relatively rare type of embolism (1:1000 or 1:500 abdominal cases) and ending fatally in 90 per cent. of the cases. (b) Pulmonary infarction due to moderate-sized emboli; not large enough to occlude the main branches of the pulmonary system, but completely obstructing the smaller vessels in which they lodged, causing hemorrhagic consolidation and pleurisy and producing characteristic clinical signs and symptoms with a mortality of from 15 to 20 per cent. (c) Pulmonary embolism with incomplete infarction due to very small emboli which lodge in the pulmonary system and produce a characteristic but mild course of symptoms, the pulmonary lesion giving rise to very few or no physical signs. This group is practically without mortality. When

referring presently to the embolic theory of the postoperative pneumopathies, I shall refer to another type of minute embolus which is more or less hypothetical, but which Cutler and his school regard as responsible for the early and more frequent pneumopathies.

The differential characteristics of the embolic group of pulmonary complications (infarctions) are usually (a) the suddenness of the onset; (b) the sharp pleuritic pain in the side; (c) slight cough with a hemoptysic tinge; (d) temperature from 100° F. to 103° F., varying with the extent of the lung obstruction and the presence of infection; (e) the late onset, usually after the first week or tenth day; (f) the physical signs of consolidation in which a pleuritic friction rub figures prominently; (g) the roentgenologic image, viz.: (1) cloudiness of the costophrenic angle, the rest of the lung being clear; (2) the wedge shape of the shadows at the periphery with their bases to the convexity of the lung; (3) the clearer, better-defined outline of the infarcted areas in comparison with those of the inflammatory pneumonic consolidations.

6. *Pleurisy,* which may be secondary to pneumonia (metapneumonic) or to an infarction, rarely primary.

7. *Atelectasis,* which may be partial, patchy or lobular, or massive, and which is variable in its physical and symptomatic manifestations according to the extent of the collapsed area. The radiologic image here offers the quickest and most conclusive diagnostic proof of the condition, and this is: (a) the dense shadow of the collapsed lung pulled with the mediastinal septum, trachea, heart vessels to the collapsed side; (b) the ascent of the diaphragm, which is high above the normal level, and the restricted movements of the chest walls on the affected side; in addition (c) as very significant among the symptoms, is the expectoration of a thick, ropy, tenacious mucus.

The Late Pneumopathies.—The early pneumopathies which now interest us make their appearance within the first two to five days, and even earlier after the operation, and may continue as late complications of indefinite duration, when pleurisy with effusion develops into an empyema, or when an aseptic embolic infarct softens into a circumscribed abscess or a purulent infiltration; or, again, the pneumonic process may continue as a chronic fibrosis with bronchiectasis; or, again, in cases of mixed anaërobic infections the con-

solidated lung, whether it be pneumonic or embolic, may end fatally in gangrene.

The classical embolisms, or infarctions, do not belong chronologically to the early pneumopathies, as they do not usually appear until the tenth day, or about the middle of the second week.

The Risk or Liability of the Operated Patient to the Postoperative Pulmonary Complication.—The liability of the surgical and particularly the laparotomized patient to the postoperative pulmonary complications, when these are considered generically and without individual differentiation, has been expressed statistically by a number of recent writers.

In 1922, Cutler and Hunt stated the experience of the Peter Bent Brigham Hospital to be one chance in twenty-five operations that the patients would develop some form of postoperative pulmonary complication, with one chance in 250 to 300 that the patient would die from the complication. Decker, of Pittsburgh, Pa., in 1921, arrived at practically the same conclusion. In 1926, Lemon (Mayo Clinic) stated that the liability to *some* type of pulmonary complication was about 1:50 operations and that 1:185 of these patients would died from it. The latest estimate of the postoperative pulmonary risk is that of Foss and Kupp, of Danville, Pa., (December, 1930), who state, on the basis of 3,433 operations (1926–1929), that of every fifty-eight operations one pulmonary complication of some sort develops, and of every 137 operations one patient dies (0.72 per cent.), as the result of a pneumopathy. This is a heavier mortality than that reported by previous observers, but not as high as Fuller's later report (London, 1930), for the surgery of the upper abdominal belt, who estimates it at 3.3 per cent. of the cases.

Experience of the Touro Infirmary.—To the above we might add the experience of the Touro Infirmary, of New Orleans. In this institution, during the period 1924–1928, 35,147 patients were admitted to the surgical services, including the surgical specialties. Of this number, forty-nine died of the postoperative pulmonary complications, or about 0.14 per cent. of the total surgical population, including the surgical specialties (eye, ear, nose and throat, and genito-urinary). In the same period there were 128 deaths in the surgical division and of these 5.7 per cent. of the deaths were caused by postoperative pulmonary complications. Of these post-operative pulmonary deaths, forty were recorded as pneumonia, including two pulmonary abcesses—4.7 per cent. There were, in addition, nine deaths caused by pulmonary embolisms and infarctions, or a little less than 1 per cent. of the deaths.

Of these forty fatal pulmonary complications:
    57.5 per cent. followed abdominal operations
    20.0 per cent. followed operations on the extremities, including fractures
     7.5 per cent. followed extrathoracic, including breast, operations
     5.5 per cent. followed intrathoracic operations (empyema)
     5.0 per cent. followed head operations
     5.0 per cent. followed tonsillectomies

It is to be noted that six of the nine postoperative pulmonary embolisms followed abdominal operations and that the two fatal post-tonsillectomy abscesses can also be probably classed in this group. These local data are very much in accord with the general experience. They confirm the fact universally recognized in all statistics—that abdominal operations especially predispose to, and are chiefly responsible for, these complications.

The contrast between the surgery of the abdomen and that of the extremities as sources of postoperative pulmonary complications is best exhibited in the orthopedic and children's surgical services, which are everywhere known to be relatively free from postoperative pulmonary complications.

Thus, W. L. Jordan (1923), in the course of thirty years, reported 11,000 anesthesias, for practically all extra-abdominal operations on children at the Birmingham Royal Infirmary, with only one post-operative pneumonia (Featherstone).

In a large orthopedic hospital, Delitala performed 10,000 orthopedic operations under ether narcosis, and out of this great number there were no fatal pneumopathies; only mild and transitory pulmonary disturbances were recorded. On the other hand, 6,774 laparotomies performed in the same institution under ether were followed by nineteen fatal postoperative pulmonary complications (Debenedetti).

The relative immunity of children to the postoperative pneumopathies is a significant fact in interpreting the risk of the laparotomized patient, which is low in childhood and gradually increases progressively in danger with advancing age.

From this point of view, the inflammatory postoperative pneumopathies very closely resemble the postoperative pulmonary embolisms which also seemingly excuse childhood and early youth from their attacks.

Another development in the concept in the pulmonary pneumopathies which has become more apparent in recent years is the greater liability to these complications, after operations performed on

the subdiaphragmatic organs than after operations in the lower or hypogastric belt. This is contrary to what was taught even twenty years ago, when the *danger zone* of these complications appeared to be, after gynecologic operations, on the female pelvic organs. Bie-bergiel first noted the greater liability of the upper abdominal belt in 1905, when he estimated the incidence of the pulmonary complications to be 9.6 per cent. in the upper belt, and 6.8 per cent. in the lower or hypogastric belt. Mandl puts the incidence of the upper belt at 10.5 per cent.; Läwen estimates the upper belt, 8.1 per cent. and the lower at 3.8 per cent. Sise (1927) establishes a still greater difference; upper belt, 10 per cent.; lower belt, 1 per cent. in laparotomies done under general anesthesia. This increased liability of the operations in the subdiaphragmatic abdomen has been noted with the rise of gastric and gall-bladder surgery, and is a fact confirmed by almost all of the latest statistics (Cutler, Whipple, Henderson [Mayo Clinic], Featherstone, P. Duval, Patey, W. Lister, Lambret, Razemon, and others).

On the Postoperative *"Surgical Lung."*—An important development in the contemporary history of the postoperative pulmonary complications is the realization that the bulk of these pneumopathies is constituted by an atypical, but clearly differentiated—*sui generis*—type of pulmonary consolidation, which, with certain well-defined clinical characteristics, has given it an individuality which is recognized by referring to it as the Postoperative "Surgical Lung." Up to recent times, this entity was merged statistically and clinically with the lobular or bronchial pneumonias, or, in its milder forms, vaguely referred to as a "postoperative reaction." There is no question that the lung lesions recognized in this condition have always been regarded as of an inflammatory character, since the disease runs a febrile course and exhibits distinct areas or patches of lung consolidation which suggests an abortive type of pneumonia. Clinicians are practically all agreed that this type of surgical lung is the earliest and most frequent of the postoperative pneumopathies. Whipple described it as a specific type of *"pneumonitis"* and his description tallies with the observation of almost all surgeons of experience who have paid much attention to the pulmonary complications.

Its chief clinical characteristics are described as follows: "Onset usually sudden, within the first forty-eight hours after the operation

without an initial chill, but with a sharp rise of temperature, which seldom continues high. Within twenty-four to forty-eight hours, the temperature begins to fall by lysis. During the first few hours of initial high temperature, the radiogram shows shadows in the lung in one or the other lobes; usually the right lower lobe—the shadow frequently assuming a triangular or wedge-shaped appearance. At this time, the clinical signs are dulness over the corresponding area posteriorly, with diminished breath sounds. Bronchial or tubular breathing, indicative of consolidation, do not appear as a rule for twenty-four hours and often long after these changes have been revealed by the radiographs. The expectoration is rarely rusty or blood-tinged.

A large majority of these patients recover, and, in consequence, the diagnostician is given full play to classify and label them, without the control of a postmortem verification. There is no doubt that this type of pneumopathy is the most frequent of the postoperative pulmonary complications, but its true etiology and pathology are still in doubt and under discussion. Opinions are divided between the advocates of various theories, each group claiming the preponderating rôle in the etiology.

At present, the theories that are uppermost in accounting for the pathogenesis of the pneumopathies are:

1. *The Inhalation Anesthetics.*—The theory of pulmonary inflammation (pneumonia) caused by (a) the direct irritant and toxic effect of the inhalation anesthetics on the bronchi and lung parenchyma; (b) aspiration of septic or contaminated material from the mouth and nasopharynx or the entrance of vomited matter into the larynx in the course of general narcosis. These two theories have already been discussed in connection with the relation of the anesthetics to the lung complications.

(c) *The Specific Air-borne Infections.*—We now must consider a more definite and recently elaborated theory which attaches a specific microbial cause to the inflammatory or pneumonic pneumopathies. A. O. Whipple (New York) first described this complication, in 1918, as a postoperative pneumonitis caused by the entrance into the bronchial tree of the specific pneumococcus type IV, which is a normal inhabitant of the mouth and nasopharynx. This pneumococcus, which is usually of low virulence, when implanted

into the lung under favorable conditions, may develop into that type of surgical lung which we have previously described and which Whipple regards as being by far the most frequent of the postoperative pneumopathies. The specificity of Whipple's postoperative pneumonitis is based on the bacteriology of the sputum which reveals the pneumococcus type IV in 88 per cent. of the pneumonitis cases. In a certain number of cases the same organism agglutinates in the patient's serum and the urine shows a precipitin reaction which is specific, according to Whipple and Cleveland.

The objections that have been advanced[1] against the pneumococcal aspiration infections as the dominant cause of the postoperative pneumonitis above described, are: (1) that the postoperative pneumonias continue to appear in patients operated upon by local and regional anesthesia, despite the total exclusion of the inhalation anesthetics; (2) that pneumococcus type IV is found in the mouths and sputum of normal individuals and its presence in the expectoration is no sign of its specificity; (3) that the enormous volume of the experimental pneumonia work which has been done up to the present time does not reveal much success with inhalation infection, except in doses so large that they are not comparable to those that might be admitted into the air passages in the course of operations under general narcosis; (4) that the radiologic and clinical findings might also be interpreted in the light of embolic infarcts or atelectatic patches; (5) that while it is admitted by all investigators that bronchial aspiration occurs more or less constantly under general anesthesia, as in tonsillectomies, postoperative pneumonias rarely result therefrom.

In confirmation of these statements, see May, Thoburn and Rosenberg for radiologic studies which show the penetration of iodized oil from the nasopharynx in the course of general anesthesia; Myerson's bronchoscopic examinations which show the presence of blood in the bronchi after tonsillectomies with no consecutive infection; Daly, evidence of aspiration of particles of nasopharyngeal secretions during tonsillectomies in 78 per cent. of the cases; Iglaude and associates, experiments showing aspiration into the bronchi in 40 per cent. of tonsillectomies—all of which tends to show that pul-

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[1] See Cutler and Hunt (1922); H. L. Foss (1930) in Bibliography.

monary infection introduced by the air route is only one of the several causes of the postoperative pneumopathies, but not the only primary or exclusive cause.

(d) It is also understood that, apart from the specific type of pneumonitis of Whipple, other air-borne infections, such as the grippal and the more virulent pneumococcal types I, II, and III, may come into play as causing true classical lobar pneumonias; but these, as previously stated, are accidental or intercurrent affections and not as characteristic of the postoperative atypical form of pneumonitis which, as previously stated, constitutes from 60 to 70 per cent. of the postoperative pneumopathies.

I. *The Endogenous Infections.*—As distinguished from the airborne infections of the lung, it is important to bear in mind the possibility of the *endogenous* infections, especially in cases in which general anesthetics by inhalation are excluded. According to this view, the infection is carried from the field of the operation in the abdomen to the lungs by three possible routes: (1) the general venous circulation through the portocaval anastomoses, or the retroperitoneal veins which empty into the cava or azygos; (2) by the epigastric veins and internal mammary veins in the abdominal wall which may become contaminated in laparotomies, by infected organs, or in septic peritonitis; or (3) by way of the subdiaphragmatic lymphatics, the stomata, or the retroperitoneal lymphatics, which empty into the thoracic duct and, in this way, convey the micro-organisms through the left innominate vein into the superior cava and the lungs.

The theory of the postoperative endogenous pulmonary infections has been especially sponsored by Lambret, of Lille, 1925, and his associate, Razemon, Pierre Duval and associates, in explaining the great frequency of the pneumonias after gastric operations for cancer and chronic ulcer, in which the incidence of the postoperative pneumonias occurs in from 15 to 20 per cent. of the cases.

Razemon and Lambret on Bacterial Permeation of Gastroduodenal Ulcers.—In these operations, the gastric wall, including the submucous and serous layers, is permeated with organisms of a specific pathogenic type, but of low virulence, which grow on the ulcerated surfaces. These are chiefly the *bacillus* pylori and the *enterococcus* of Thiercelin (Lambret). In the course of a gastrectomy or a gastro-enterostomy, the germs contaminate the peritoneum

and are carried by the lymph passages of the diaphragm to the pleura and lung or through the retroperitoneal lymphatics to the thoracic duct, and thence to the lungs.

A very considerable mass of experimental evidence has accumulated in recent years which fully confirms this possibility as shown by numerous investigators (Sabin, Miller, Lenander, Kelling, Lawen, Torraca, Teitze, Lambret, Razemon, Binet and Laubry, et als.). It is in virtue of their experimental demonstrations of the infection of the lungs by the *bacillus pylori* and other organisms which flourish in gastric ulcers, that Lambret and Razemon have devised a method of prophylaxis with stock and autogenous vaccines which, in the practice of these and other surgeons, appears to have obtained some encouraging preventive results.

Hochenegg.—In this connection, it may be well to remember that Hochenegg, of Vienna, also held long ago that in conditions of intestinal stasis, micro-organisms may migrate through the walls of the colon, notably the sigmoid, and infect the iliac and pelvic veins which lie in contiguity, and in this way cause thrombophlebitis of the iliac and pelvic veins, which may, in turn, discharge emboli; these can be carried to the heart and lungs by way of the iliocaval system., This mode of endogenous infection applies particularly to the cases of thrombophlebitis of the pelvic veins following gynecologic operations for myoma and for large uterine or ovarian tumors, which are associated with marked dilatation and stasis in the venous plexuses.

2. *The Embolic Theory.*—This involves three categories of emboli: (a) minute, hypothetical emboli which reach the lung from the field of the operation through venous and lymph channels (Cutler); (b) larger, grosser emboli which are thrown off from peripheral thrombi in the pelvic and ilio-femoral veins and enter the lung through the pulmonary artery; and (c) the massive, obstructive and fatal emboli which originate in the large peripheral veins in the same way, and cause death by blocking the trunk or main branches of the pulmonary artery. The first type is supposed to account for the early or precocious pneumopathies of the first three days. The second and third appear later in the second week.

The view that the postoperative pulmonary complications are caused by minor emboli thrown off from the field of the operation,

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retroperitoneum, as well as by way of the epigastric and internal mammary veins.

Objections to the Theory of Embolic Showers.—The chief objection to the theory of early embolic showers from a clean abdominal incision is that it is entirely a hypothetical assumption which is incapable of demonstration and is contrary to our knowledge of the behavior of hemostatic wound thrombosis in clean abdominal incisions. Furthermore, the marked febrile reaction that characterizes the early postoperative pneumopathies of the first twenty-four hours, as well as the physical signs, do not accord with the concept of minute emboli thrown off from a clean, aseptic operative field. On the other hand, no one disputes the fact that minor and major emboli do cause infarction of greater or lesser extent and gravity and that these can be readily differentiated clinically, radiologically and anatomically at the postmortems of fatal cases. These infarctions always appear late and not usually until the beginning of the second week, tenth or eleventh day. Nor is there any question that the massive obstructive emboli are not only actual realities, but the most formidable of the postoperative complications; fortunately, these are relatively rare and occur approximately only once in 500 or 1,000 laparotomies with marked variations according to the age of the patient, the disease, and the organs involved.

The only matter in dispute is whether embolism is responsible for the acute febrile pulmonary lesions of an inflammatory character that appear within the first three days of the operation and constitute the great bulk of the postoperative pneumopathies. The difference lies simply in the clinical and pathogenic interpretation. Whipple and associates describe it as a specific pneumonitis, while Cutler and his school attribute the same condition primarily to an embolic pathogeny.

The following figures quoted from recent publications show how differently competent authorities interpret their clinical experience and how they differ in their estimates of the proportion of the embolic infarctions to the other postoperative pneumopathies:

	Embolic Infarctions
Cleveland (Whipple's Clinic, Presbyterian Hospital, N. Y., 1919)	1.7 per cent.
Fuller (University College Hospital, London, 1930)	7.2 per cent.
Aikenhead (Manitoba, 1930)	16.6 per cent.

mopathies caused by aspiration of specific organisms or septic mate-
rial through the glottis to be regarded as primary causes. As a
rule, however, some form of bronchitis coincides or precedes the ate-
lectasis in laparotomies under general anesthesia. This, however, is
far from a constant accompaniment. Infection, from no matter what
source, is only a secondary factor in the causation of the pneumonic
state, which only becomes active as an inflammatory process when
and after pulmonary atelectasis has been established. Atelectasis is
therefore the first stage of a postoperative pulmonary pneumonia.

It is utterly impossible in the time limit of this program to enter
into a discussion of this most fascinating postoperative complica-
tion or to do justice to the views and researches of recent writers,
and particularly of Coryllos and his associates. I can only say
that were his theory true it would unify and simplify the etiology
of the postoperative complications and, what is more, as the author
states, it would lead the way to a rational curative and prophylactic
treatment based on cause and not on symptoms.

Unfortunately, there is one basic phenomenon that the atelectatic
theory does not explain, and that is: why is it that bronchial ob-
struction accompanied by the secretion of mucus occurs so suddenly
and rapidly, leading to the plugging of the bronchioles and prevent-
ing the ventilation of the lung by collapse of the air cells? Espe-
cially is this a serious objection when we consider that the bron-
chitis which Coryllos and others appeal to as a necessary preliminary
to the atelectatic process is so often missing. There are, indeed,
other objections to this theory which are quite valid, but which it is
impossible to consider at the present moment. It should also be re-
marked that atelectasis is not exclusively a postoperative phenomenon
after abdominal injuries. It has been recognized as coinciding with
a variety of pulmonary injuries, such as non-penetrating wounds of
the thorax and abdomen, injuries of the lower extremities, fractures,
intestinal obstruction and peritoneal affusions, abdominal and tho-
racic tumors, and, what is still more interesting, it may appear as a
*spontaneous manifestation in the lungs without any sort of trauma
whatsoever.* These facts give support to the theory of its reflex,
spastic and probable allergic origin.

In the midst of the controversy that is now agitating the minds
of all interested in this remarkable phenomenon, there is one fact

that seems certain in that the pulmonary collapse and emptying of the alveolar air are initiated by an obstruction in the bronchioles which is associated in the majority of the serious cases with a hypersecretion of tenacious mucus. It would seem plausible in view of the suddenness with which the atelectatic state is induced and the rapidity with which it is often relieved, that the theory of reflex spasm of the bronchial musculature as originally advocated by Rose Bradford, Sante, Scott, Elwyn, W. Morrison, and others, is the more plausible working theory, at present. It matters not by what efferent nerve tracts this reflex bronchial spasm is induced (for instance, "vagus stimulation," Einthoven, Dixon and Brodie and others)—the essential fact remains that a sudden obstruction is created in the bronchioles which arrests the alveolar ventilation and permits the accumulation of mucus in the bronchial terminals.

Arrived at this stage, two secondary theories dispute the cause of the alveolar collapse. According to the mechanical theory of the "mucous plug" (Elliott, Dingley, Jackson and Lee, Coryllos and Birnbaum, Bowen and others), the alveoli are cut off from outside communication and the ventilation of the alveoli ceases. In consequence, the imprisoned alveolar air is retained and the lung in the obstructed area collapses with the establishment of the atelectatic state. This we might designate as the *absorption theory of alveolar collapse.*

According to the other theory, recently advocated by Morrison, Luisada and the Italian School, the whole lung is a muscular organ, not a cubic millimeter of lung tissue failing to show smooth muscular fiber (Baltisberger, Macklin, Luisada and his School). Therefore, it is not only the bronchial musculature that contracts, but the lung itself participates in the spasm and in this way the air in the alveolar spaces is forced out (not absorbed) coincidentally with the bronchial spasm. A partial atelectasis is thus produced which is completed when the walls of the terminal bronchioles are brought into apposition, the molecular adhesion effectively preventing the reëntering of air.

The prevailing opinion that the air in the alveoli could not escape if the bronchioles opening into them were completely obstructed, and that the entrapped air could be removed only by *absorption* into the perialveolar blood, has been disproved in so far as the lobular bronchioles are concerned, by the recent re-

searches of Van Allen and Lindskog, which show that in the normal lung "the partition that divides one alveolus from another and one lobule from the next, in a single lobe of a lung, permits air, fluid and finely particulate matter to pass through "even under the pressure of a deep or forcible inspiration."

What we gather from these researches is that a lobular, patchy atelectasis may be caused by the *expulsion* and displacement of the alveolar air by a spastic contraction of an actively contracting lung and that *absorption* is not essential to the atelectatic process even in total lobular bronchiolar obstructions.

While so distinguished an authority as P. Coryllos does not accept the *expulsion* or the *bronchospastic* theory of atelectasis, it would seem to the clinician, observing the patient outside of the laboratory, that the dual concept of alveolar apneumatosis by both air *absorption* and air *expulsion*, according to the anatomical seat of the bronchial obstruction (whether lobular or lobar) is a far more adequate explanation of the protean phases of active atelectasis, than by an *exclusive* air-absorption theory.

Neither is the theory of the "mucous plug" acceptable as an exclusive cause of bronchial or bronchiolar obstruction. While mucous hypersecretion is recognized as a prime factor in many of the graver cases of post-operative atelectasis, it certainly does not appear to be the only factor, more especially in the numerous cases in which atelectasis comes suddenly without any evidence of bronchial hypersecretion ("mucous plug") and disappears almost as rapidly, leaving scarcely a trace behind it. No one who is familiar with the literature and who appreciates the life-saving value of bronchoscopic aspiration in many cases, would minimize the importance of bronchial obstruction as a factor in the atelectatic process; but the evidence that is rapidly accumulating on this subject makes it plain that pure mechanical bronchial obstruction is not the only or essential cause of alveolar apneumatosis. The one pleasing thought that rises above all the doubt of conflicting experimental and clinical evidence and opinion is the prospect of an early clearing of the present foggy atmosphere by the continuous and earnest efforts of able investigators to bring new light to the problem. No one can read the Transactions of the last meeting of the American Association for Thoracic Surgery in Philadelphia (June, 1930) without a profound feeling of admiration and respect for the scientific ability and unsparing effort that Coryllos and Van Allen and their associates have displayed in pursuing their researches into the minutest recesses of this phase of the difficult but fascinating problem of postoperative atelectasis.

Luisada and the Electrobronchograph.—The very recent experimental researches of Aldo Luisada (1929–1 · ` and his associates at Padua, based on Luisada's disco｜ ·trol｜ of are likely to prove of importance ! tl· of atelectasis. This apparatus, when i｜ b: c- tions like the electrocardiograph in｜ q generated by the contractions of th｜ pulmonary muscu (The bronchop｜ l: matic, rhythmic n｜

external respiratory movements or other extrinsic influences, as can be demonstrated on the isolated and detached lung of the rabbit, cat,

FIG. 1.
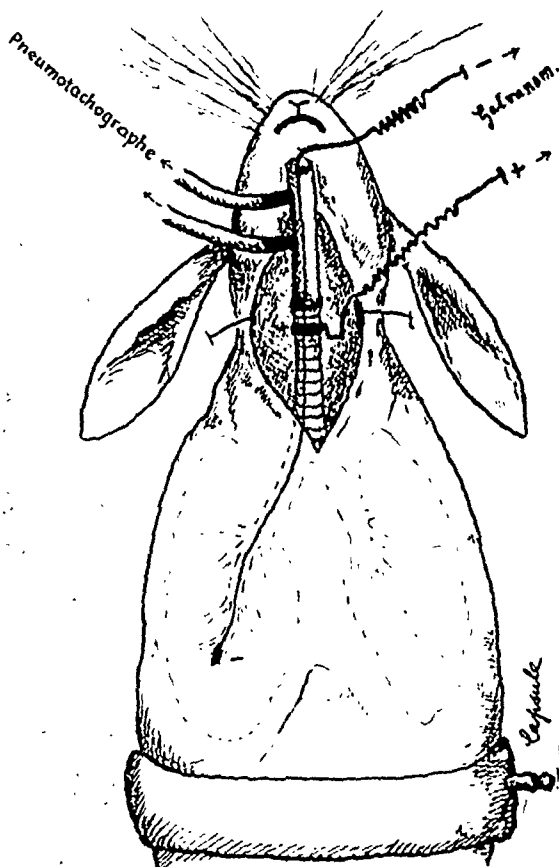
THE ELECTROBRONCHOGRAPH

As devised by A. Luisada for the registration of the electric currents generated by the bronchopulmonary musculature. A rubber tube is attached to the trachea through which a negative electrode (insulated copper wire with a bulbous tip wrapped in cotton soaked in physiologic salt solution) is carried to the farthest bronchus. The positive electrode is a wet cotton thread or tape wrapped around the denuded trachea. The pulmonary currents are collected in a specially constructed "amplifying-thermoionic filter" (Pasoli). The diagram shows the belt pneumograph (capsule) for registering the respiratory movements and Fleish's pneumotakograph for recording the speed rate of the respired air. (From Luisada, A.: "La Contractilité Active du Poumon," Arch. Méd.-Chir. de l'Appar. Respir., vol. 5, pp. 323-326, 1931.

dog or guinea-pig. The electrobronchograph has been used very extensively in the study of the physiology and pathology of the lung

in experimental animals and even in living human subjects (twenty patients).

All the facts thus far obtained tend to prove that the lung has regular rhythmic movements of contraction and relaxation (systolic-diastolic) which occur synchronously with the respiratory movements and yet are independent of them. These contractions are stimulated into activity by the distention of the bronchi and are most strikingly manifested in the phase of spontaneous retraction which follows the bronchial distension. Tracings of the muscular contractions with alterations in volume may be demonstrated with the electrobroncho-graph in the isolated lungs of the rabbit and cat for hours if the lung tissue (whether the whole lung or one of its lobes), is preserved in warm and moist surroundings.

In devising an electrobronchograph for practical use in experimental animals and in the human subjects, many obstacles had to be overcome, notably the isolation of the bronchial currents from those of the heart, in recording the waves of bronchial contraction in a closed thorax. The special methods and technical devices ingeniously invented by Luisada and his associates have met these difficulties and permitted him to make a series of clinical observations on the human lung which are of great interest physiologically and therapeutically.

The researches that bear upon the action of the vagus, the sympathetic and phrenic nerves, on the contracticity of the broncho-pulmonary parenchyma are especially interesting in connection with the pathogeny of the postoperative pulmonary complications. The one fundamental fact that comes out of these investigations is that the lungs can actively contract and undergo variations in volume which are independent of mere elasticity and of the action of all intra- or extra-thoracic forces.

The bronchograph shows the sensitiveness of the lung muscle to direct and reflex stimuli and to the effect of drugs, such as the inhalation anesthetics, ether and chloroform; also morphia, atropine and papaverine.

Of special interest are the effects of splanchnic anesthesia by infiltration of the solar plexus with novocaine. But even more interesting is the bronchographic study of the effects of trauma applied to the stomach (traction, incision, suture) and organs supplied by the

FIG. 2.

(a) Electrogram obtained from the isolated lungs of a rabbit rhythmically distended by an air pump, using the impolarizable electrodes of Du Bois-Raymond, an amplifying thermoionic lamp and a mirror galvanometer.

(b) Shows a diaphasic wave in expiration when the lung is over-distended. The electrogram tracings are shown above and the respiratory curve below. (LUISADA, A.: "La Contractilité Active du Poumon," *Arch. Méd.-Chir. de l'Appar. Respir.*, vol. 5, p. 325, 1931.)

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vagus and the solar plexus. In his most recent paper, Luisada, jointly with Oselladore (*Clin. Chir.*, November 30, 1930) arrives at the following practical conclusions:

(1) An abdominopulmonary reflex is roused by mechanical stimulation of the stomach and the solar plexus which induces a reduced ventilation of the lung and a diminution in the expulsive power of the bronchi. This fact contributes to a retention of the bronchial secretions and to an alveolar atelectasis, conditions which are recognized as the most important factors in the pathogenesis of collapse and postoperative pneumonitis.

(2) The fact that blocking the abdominal sympathetic with a local anesthetic suppresses the abdominopulmonary reflex would seem to account for the relative freedom from pulmonary complications that is claimed by many surgeons for splanchnic anesthesia and high spinal, when used for laparotomies. The marked influence upon the musculature of the lung would seem to confirm that injuries of the solar plexus have some influence in favoring the development of the postoperative pulmonary complications.

(3) The depressing effect of ether and chloroform, when administered by inhalation, upon the contractility of the bronchopulmonary muscle, favors the stagnation and retention of bronchial secretions as well as a diminution in the alveolar aëreation, which are most important factors in the pathogensis of the postoperative pulmonary complications.

(4) Paradoxic as it may seem, the bronchograph demonstrates that morphia and ether (not by inhalation) in small doses have a marked stimulating effect on the musculature and mobility of the lung, which suggests the use of these drugs (contrary to our preconceived ideas) as prophylactic and therapeutic activators of the respiration in the postoperative pulmonary complications.

These investigations are too recent to permit of decisive or final conclusions in regard to the production of bronchopulmonary spasm by manipulations and traumatisms of the stomach and subdiaphragmatic viscera, such as occur in laparotomies, but all the evidence thus far gathered points to the possibility of causing bronchopulmonary spasm sufficient to expel the air from the alveoli and thereby produce atelectatic phenomena.

While these researches would seem to account for the initial phases of the atelectasis, there are still other problems to solve.

If the atelectasis is caused by reflex bronchopulmonary spasm provoked by abdominal surgery or by traumatic stimulation elsewhere, why does this phenomenon occur in some individuals and not in others under seemingly identical traumatic conditions? Evidently the individual constitution or susceptibility to allergic reactions must here come into play as in asthma, hay fever, urticaria and other anaphylactic states, as a predisposing factor.

Here again an unstable (labile), vegetative nervous system, which is easily unbalanced by any form of peripheral excitation, plays a part in the pathogeny just as the traumatism of an operation may so disturb the chemistry and physiology of the organism as to upset the thrombin-anthrombin balance of the blood, and precipitate a thrombus in a thrombophilic individual.

In this line of thought, the recent paper of Lee, Wilmer, and Cobb, 1930, in which they show that every case of postoperative massive atelectasis observed by them was asthmatic, or definitely allergic in other ways, is eminently suggestive, and opens the way to another etiologic factor—*allergy*—in the complex problem of the postoperative pulmonary complications.

It is well understood that, while atelectasis may be the initial process, it may develop into infective bronchopneumonia, if the lung or bronchial tract is already infected, just as an infectious process may be grafted in the atelectatic lung by septic emboli, or, conversely, an aseptic embolic infarction may become infected secondarily by preëxisting or coexisting bronchopulmonary infections.

The reason why the abdomen, and especially the upper or subdiaphragmatic belt, should be the most important danger zone for the production of postoperative pulmonary complications has not been considered in this discussion. This question, which has been productive of much experiment and speculation, has not been satisfactorily answered but can be expected to reach a solution, since the methods of pulmonary functional investigation are entering into a new and illuminating phase of experimentation in which the discovery of the electrobronchographic methods introduced by Luisada and the Paduan School may help to throw additional light.

CONCLUSIONS

The unbiased investigator who is trying to arrive at some clear notion of the pathologic processes that are involved in the production of the postoperative pneumonias or pneumopathies finds himself fettered by the great mass of contradictory experimental and clinical data that have evolved out of the investigation of this subject, even up to the present. Always a difficult etiologic problem, the pathogenesis of the postoperative pulmonary complications becomes even more confused since atelectasis has been added to the complexity of the problem. None the less, there are some conclusions that seem to stand out in the discussion as facts and not as mere theories.

The facts are: that the surgical patient, especially the laparotomized patient who has undergone an operation in the upper or subdiaphragmatic belt, is liable to at least three forms of postoperative lung pathology. First, that form which we have already described as an inflammatory reaction to a bronchopulmonary infection, which is clinically an atypical abortive type of lobular (catarrhal) bronchopneumonia (the pneumonitis of Whipple). This, as a rule, begins in the first twenty-four or forty-eight hours after the operation, runs a febrile course and ends usually in recovery. Of the existence of such a type of pneumopathy, and that it is the most frequent of the postoperative pulmonary complications, there can be little doubt. All forms of pneumonic consolidation may appear in the surgical patient, but the classical lobar, croupous pneumonias caused by pneumococcus I, II, and III, appear only as intercurrent, or exceptional infections; they are not characteristic of the postoperative program.

There is sufficient evidence to prove that the majority of these infections are air-borne, of autogenous origin, and are of a descending type, and .that the general inhalation anesthetics predispose to their occurrence.

There is also a minority of postoperative pneumonias which are caused by endogenous infections, conveyed from the field of the operation and from various sources, particularly the gastro-intestinal tract, in which pathogenic organisms reach the lung by the blood- and lymph-streams.

The *second* source of the postoperative pulmonary complications

is thrombosis, embolism and embolic infarcts, which may be septic or aseptic, causing pulmonary consolidations of variable extent and virulence, in which the so-called infarct- or embolic-pneumonias are included.

The *third* type of pathology is the atelectatic consolidation of the lung, which may appear as partial, lobular, patchy or lobar collapse.

There is at present practically universal agreement that the pathology of the postoperative lung is based upon this pathogenic triangle. There is a general agreement in regard to the clinical types, but marked disagreement on their pathogenic interpretation and their relative importance in the postoperative nosology.

Those who hold to a specific air-borne bronchopneumonia pathology (Whipple and others) claim that 60 to 70 per cent. of the postoperative pneumopathies are of this category. Those who hold that embolism and the embolic infections dominate the pathology of the surgical lung (Cutler, Ducuing and others), claim that embolic processes are responsible for 60 to 70 per cent., and even more, of the postoperative pneumopathies.

Finally, those who hold that atelectasis is the initial phenomenon in all the pneumopathies, and that atelectasis and postoperative pneumonia are convertible terms—atelectasis being only a phase of the pneumonia,—virtually absorb the whole pathology of the postoperative pneumopathies by excluding all the other primary causes. When we realize that all the latest contributors to this subject agree that atelectasis is the most frequent of all the postoperative complications, with an incidence of 60 to 70, and more, per cent., it is evident that two out of the three of the above-quoted estimates of incidence must be wrong since they cannot all prevail in the same preponderating excess.

It is evident, also, that the statistician who would attempt a study of the *relative* incidence of the three pathogenic processes, pneumonia, embolism, and atelectasis, in the presence of such conflicting statistics, would surely have to give up his task as a futile and profitless undertaking.

From the present outlook, it would appear to the unprejudiced investigator that the line that separates the inflammatory, specific, pneumopathies from the embolic, and these from the atelectatic lesions, is like a movable partition which, clinically at least, can be

shifted backward and forward to suit the mental bias of the statistician.

In our experience, collective statistics of incidence based on purely clinical diagnoses are generally undependable in view of the extreme variations in the interpretation of the same clinical material, as this is recorded in even the latest hospital reports.

The available statistics of mortality are fairly reliable as to gross, undifferentiated postoperative mortality, but even these are dependable, so far as correct diagnoses are concerned, only in institutions in which the causes of death are verified by autopsy, at least in the majority of such cases.

The outlook is promising for decided improvement in the future, for greater accuracy and dependability in the statistical data, in view of the great interest displayed everywhere in the study of the postoperative pulmonary complications and in the constantly improving efforts at clinical, radiologic and laboratory research and differentiation.

The attempt to explain all the postoperative pneumopathies on one basis and to expect to unite these under one single etiologic factor is illogical and worse than futile.

Whatever the type of the postoperative complication, whether it be the aspiration pneumonitis of Whipple, the embolic infarctions of Cutler, or the atelectatic pneumonia of Coryllos, and their coworkers, or a combination of all these, the prophylactic treatment advocated originally by Henderson and Haggard (1921), Scott and Cutler (1928), and emphasized by Coryllos and Birnbaum (1930) and others, for massive collapse of the lung with a mixture of carbondioxide and oxygen, immediately after an operation and especially a laparotomy, promises to be one of the most valuable acquisitions of modern pulmonary therapy. It has proved of great value in our experience, not only as a prophylactic by ventilating the lung, but by diminishing the tendency to pulmonary stasis at the bases, which occurs so constantly in shocked or exhausted patients; it is also valuable, by favoring the expulsion of mucus by coughing. Later, the Roth-Barach oxygen tent or other similar appliance is the most effective symptomatic treatment for the postoperative pneumonias in general, after these have been established, and as the experience

of Binger, Judd, Moore, Wilder and Passalaqua and others has recently well demonstrated.

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SOME NOTES ON MENINGOCOCCIC MENINGITIS, WITH ESPECIAL REFERENCE TO THE SUGAR CONTENT OF THE CEREBROSPINAL FLUID

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THE present report has to do with a series of sixty-five cases of meningococcic meningitis that were studied in the wards of Charity Hospital during the latter part of the year 1929 and in the first part of 1930. These cases occurred on the service of one of us (J. H. M.) and the service of Dr. J. G. Stulb.* Although the primary purpose of the paper is to illustrate the prognostic importance of daily spinal sugar determinations during the treatment of patients with meningococcic meningitis, opportunity will be taken to present and to discuss the clinical data of this series of cases. The value of the sugar determinations will be taken up in somewhat more detail than the rest of the presentation and will be illustrated by a few specimen charts, one of which was kept upon every patient with meningitis who was admitted to the contagious ward of the hospital.

There were sixty-five patients admitted, who were studied intensively. The clinical facts concerning the patients that recovered will be contrasted with the same data observed in patients who died. Of the sixty-five patients, twenty-seven recovered. The ages of these patients varied from three months to forty-three years. There were six individuals under two years of age, eight children under ten and of the remainder only four were thirty years old or older. Twelve of the patients who recovered were white and fifteen of them were of the colored race. The great majority of the patients who were admitted and recovered had had the disease for only a few days, the average interval between the development of symptoms and the institution of serum therapy being 4.4 days. This average time interval is greatly enhanced because of the fact that several patients who recovered came in many days after the development of the symptoms,

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* Our thanks are due Doctor Stulb for the privilege of studying his cases.

one of whom entered the hospital in the eleventh day of her sickness. Nine of these patients were completely rational when admitted to the ward and eighteen of them were irrational, sometimes wild and delirious and at other times comatose. The count of the cells in the cerebrospinal fluid on admission showed, with the exception of one case, the number to exceed 1,500. In only one instance was the count over 21,000, when it was found to have attained the remarkably high figure of 56,000. This patient improved remarkably after her first injection of antimeningococcic serum and recovered after twenty-six days in the hospital. One patient had only 750 cells on admission. From the thousands of cells that were found when the patients were first tapped, the drop to figures only slightly above normal when they were discharged was quite a striking observation. In these patients who recovered the average total white blood-cell count was 18,000, the highest being 24,500 and the lowest 9,000.

These patients were all treated by more or less the same routine. It is the custom when the patient is admitted to the hospital with symptoms suggesting meningitis promptly to do a spinal puncture for diagnostic purposes. The type of organism is determined in a few hours and then a second puncture is done with the introduction of a specific meningococcic serum if the organisms present are meningococci. In the succeeding twenty-four hours two or three spinal punctures are done eight to twelve hours apart, depending upon the severity of the symptoms, the cell count and the amount of fluid withdrawn and the degree of tension. If these figures are increased, three punctures are performed; if not, two are deemed ample. The next two to seven or eight days, two punctures a day are usually done, but if the patient does not seem to be improving and if the spinal fluid tension is high, frequently they are tapped three times in the course of twenty-four hours. It has been the custom to do frequent cisterna punctures. In the early stages of the disease the cisterna punctures alternate with the spinal punctures. Later on, as the patient improves, the cisterna puncture is discontinued if there is no difficulty in entering the spinal canal and the patient continues to get better. It can be thus seen that a large number of punctures of either the cisterna magnum or the spinal canal are carried out in

each instance.* Thus, in our twenty-four cured cases, the smallest number of punctures was eleven, the largest number was forty and in many instances between thirty and forty were done. Serum is injected with the ordinary precautions in quantities equivalent to the amount of spinal fluid withdrawn, less 3 to 5 cubic centimeters, depending upon the size of the patient and the amount of fluid withdrawn. The serum that we used came from one or another of three large biologic houses and a certain amount of it from the New York State Board of Health. The amount given varied from a minimum of 165 cubic centimeters to 740 cubic centimeters. The 165 cubic centimeters were given to a very small child. The average patient was given between 350 and 450 cubic centimeters of the serum. On account of the variations in the specificity of the meningococcic serum, changes were made from time to time if the patients did not seem to be improving with the serum from one or another of the different houses. Patients were kept at the hospital from sixteen to fifty-three days, the great majority staying a few days over or a few days under a full month.

Some rather interesting contrasts present themselves in the study of the patients who recovered and those who died. The number of cases is too small to draw conclusions, but they are at least suggestive. For example, from the age of the patients we have a rather definite impression that very young individuals are more likely to recover than the older individuals. Five of our babies under two years of age died, whereas six of them recovered. In the group who died there were seven who had passed the age of forty, and the average age of this group as a whole was considerably higher than those who recovered. The ratio between the two races is about the same irrespective of whether they were white or colored, or whether they lived or died. A striking observation is the fact that in the patients who died, 7.5 days passed before the recognition of the character of the disease and the institution of the specific therapy, a period of three full days greater than those patients who survived. Of the thirty-eight patients that succumbed, only three of them were rational on admission to the hospital. Their cell counts were invariably higher

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* It should be understood that the last few spinal taps are not accompanied by the introduction of specific serum. They are merely drainage of the canal for the purpose of checking up on the spinal fluid.

by many thousands than those of the patients who recovered. The leukocytic picture did not vary very much between the two groups of cases. In the majority of instances, these patients who died, died very promptly after admission to the hospital, so that only two, three or four spinal punctures or cisterna punctures were done. Several patients who died had had numerous punctures. One, who had had a total of forty-five punctures, died during convalescence, presumably of some cerebral accident. Two, who were apparently recovering after thirty-two and twenty-six spinal and cisterna punctures, had a recrudescence of the disease and died. Two of the patients developed subarachnoid blocks. Another was apparently successfully combating meningitis and died as a result of bronchopneumonia. With the exception of those patients who had numerous punctures, of which there were but few, the stay in the hospital before death was usually a matter of hours rather than days. The two patients who developed subarachnoid block were in the hospital for nine and fifteen days, respectively. The patient who died in convalescence, after receiving 1,333 cubic centimeters of serum, had spent thirty-three days in the ward. Practically all of the remaining patients were so overwhelmed by their infection that they were unable to respond to the serum, most of them being moribund when admitted to the ward.

PROGNOSIS

It is difficult accurately to evaluate the severity of the symptoms in cerebrospinal meningitis. From the clinical point of view there are several features which point to a severe course with likelihood of death. The first of these is the character of the onset. The more acute the onset and the more fulminating the developing symptoms, the greater is the likelihood that the patient will die. Almost invariably these patients are infected with a virulent organism. Another important factor which has to do with any infectious disease may be present, namely, lack of resistance. However, this seems to be an agent of minor importance. We have noted in this series of cases that those who have the rash of meningitis usually will not recover. We have seen only one patient recover who had the petechial eruption of the disease. The patients who present marked retraction of the head and marked spasticity of the muscles as a rule do better than do those who have marked irrationality without much evidence

CHART 1.

Chart showing composite spinal fluid sugar curves of patients who recovered and those who died.

——— Recoveries
········· Deaths

CHART 2.

NAME

J. T. 14 yrs.
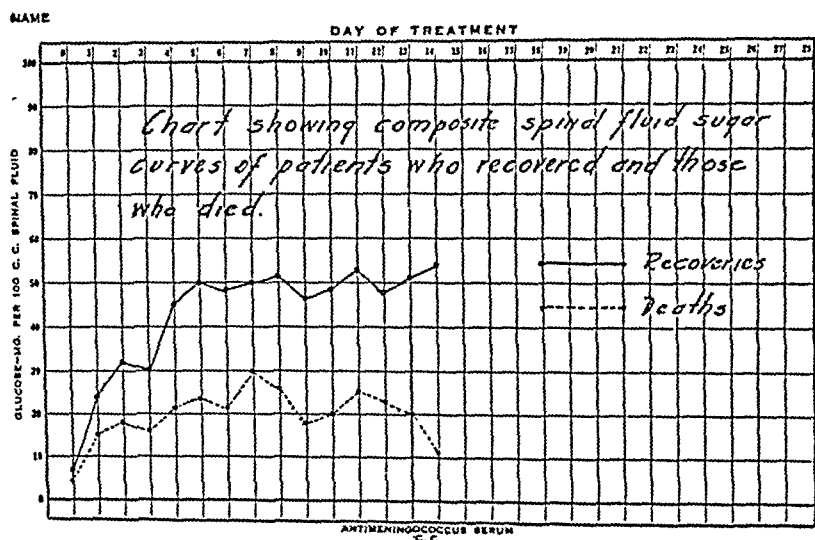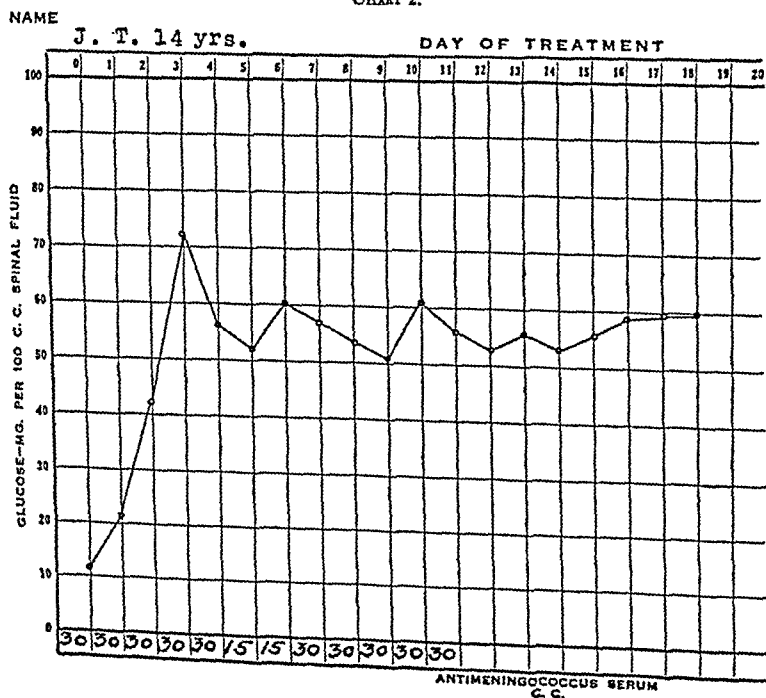
of spinal irritation. This is as would be expected. In the one the involvement seems to be chiefly spinal; in the other cerebral, and cerebrospinal meningitis is a disease in which not only the meninges are involved but also the encephalon.

The examination of the spinal fluid also offers some prognostic information and this statement applies particularly to those patients in whom the fulminating feature of the disease is not accentuated,

CHART 3.

NAME E. B. 7 yrs.
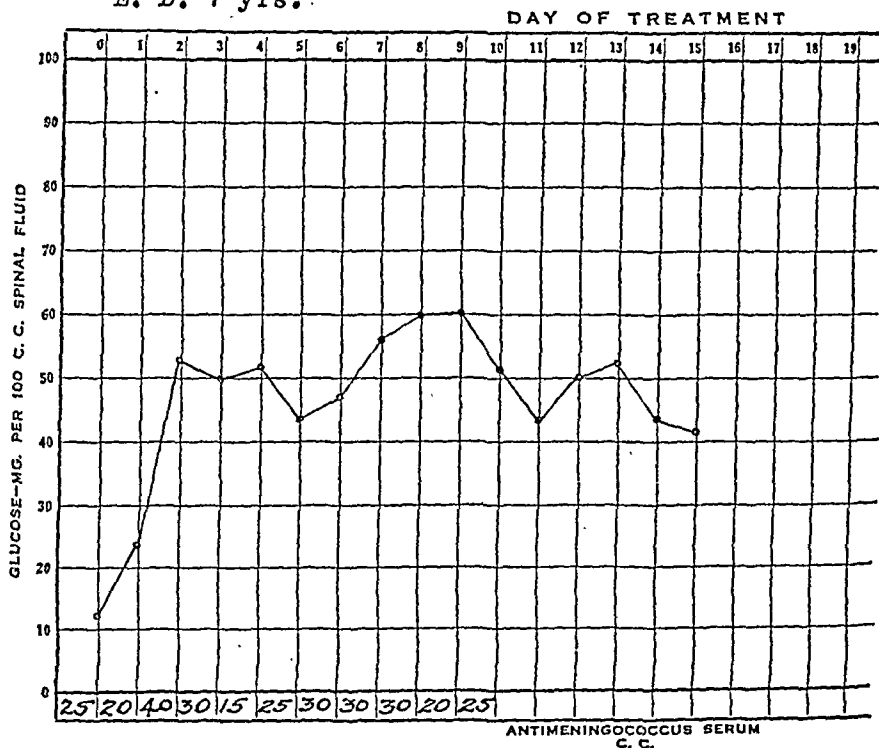
but who have had numerous spinal punctures. In the patients who recover, meningococci disappear very promptly from the smear. The cell count of the spinal fluid falls relatively rapidly and the tension of the fluid likewise becomes less rather rapidly. These signs, however, are by no means definite and positive. In many instances we have noted clinical improvement, fall in temperature, decreased pulse rate, clearing up of the mentality and a reduction in the cell count, signs indicative of improvement, in patients who would suddenly without any demonstrable reason become worse and die. The reappearance of meningococci would often be noted

twenty-four to forty-eight hours after the patient had gotten worse. The most positive and definite prognostic finding that we observed in this series of cases was the improvement that took place in the sugar content in the spinal fluid. One of us (J. H. W.) examined daily the spinal fluids of the sixty-five patients under observation to determine the quantity of sugar present per 100 cubic centimeters of spinal fluid. The Folin-Wu method was employed and an average

CHART 4.
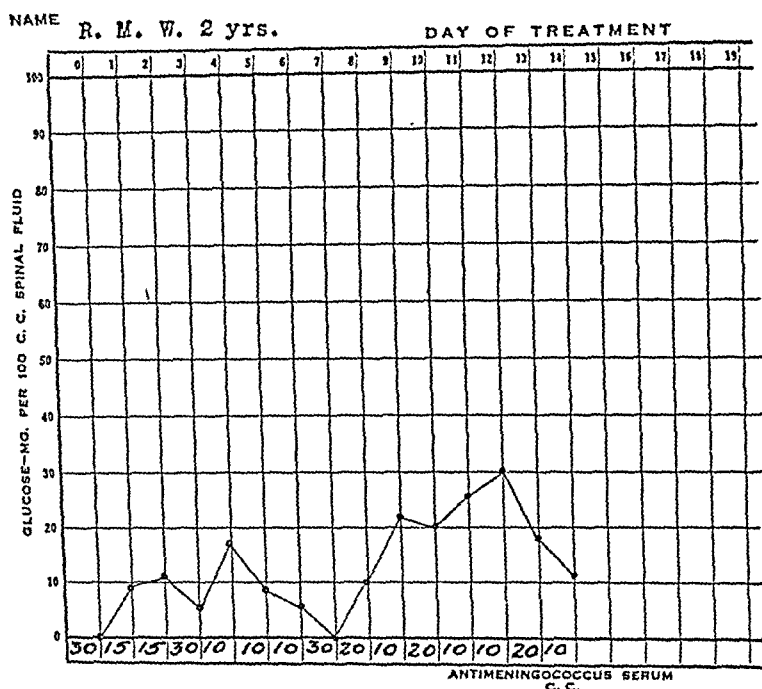
of eighteen determinations was made on those patients who recovered and six on those patients who died. In the majority of instances the fluid was examined approximately two and a half hours after it had been removed, but in a certain number of instances the spinal fluid was placed on the ice over night without the addition of preservatives. The keeping of spinal fluid in the ice-box apparently has but little effect on the sugar content, as Chevassut has shown that at a very low temperature the sugar content decreases little if any. In a certain number of instances (eleven) simultaneous blood-sugar determinations were made on the blood removed at the same

time as the spinal fluid. There apparently is not enough deviation of the blood-sugar concentration in patients who have meningitis to affect any alteration of significance in the sugar concentration of the spinal fluid. The figures for spinal sugar in the normal individual are found to vary between 45 and 80 milligrams as the normal limits of variation. There exists a reasonably constant relationship between the two body fluids, so that in the average individual free from

CHART 5.
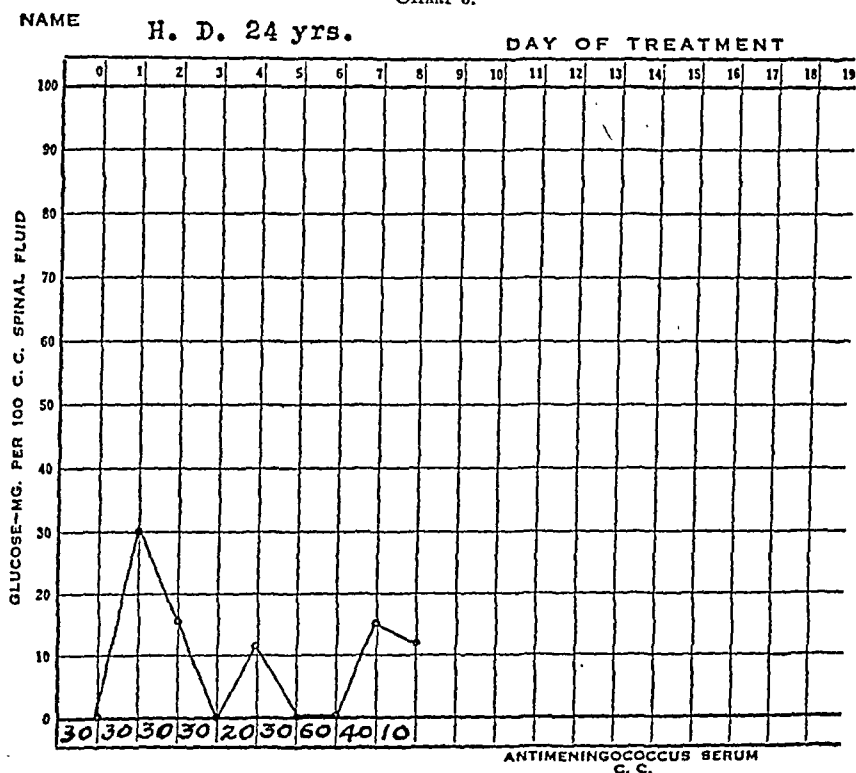
disease of the central nervous system the spinal-fluid-sugar concentration will be approximately half that of the blood sugar. With a reduction in the spinal sugar, as Austin and his co-workers have shown, there presumably is an increase in the lactic acid in the spinal fluid.

It is our purpose to illustrate by charts specific changes that occurred in a number of cases. Chart I is a composite chart which shows the spinal-fluid sugar in the patients who recovered and those who died. The chart is self-explanatory. It will be noted that in all the charts the concentration of sugar in the spinal fluid at the

onset of the disease was extremely low. In some instances there was apparently no reaction to the reducing agent when the patient was first punctured.

Charts II and III illustrate the type of sugar curve that occurs in patients who recovered. It will be noticed that there is a prompt rise in Chart II of the spinal-fluid sugar and therefore figures which are approximately normal are maintained. It will be noted, further-

CHART 6.
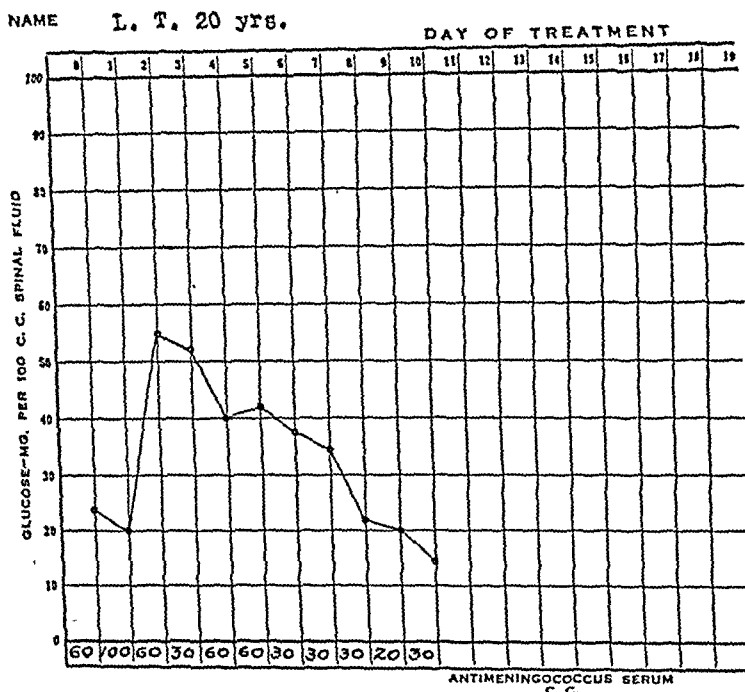
more, that even after the specific serum has been discontinued the fluid removed by subsequent drainage does not alter materially the sugar content. In Chart III the sugar content has risen to 53 milligrams within forty-eight hours after the child had first received specific therapy. The fluctuations from day to day were rather marked but at no time did sugar concentration fall below 40 milligrams per 100 cubic centimeters, normal figures.

The next series of charts is illustrative of the figures that we obtained in fatal cases. Chart IV is that of a little girl of two years who, when she was admitted to the ward, was in the fourth day of her disease. The child was comatose on admission. The cell

count of the spinal fluid was 20,000 and the leukocyte count was 24,500. She remained in the hospital for fourteen days, during which time spinal or cisterna puncture was performed twenty times and she was given a total of 250 cubic centimeters of serum. There was some improvement in this child's condition following specific therapy, but at no time did the sugar figures attain those of normal and apparently the serum did not exhibit the usual specificity shown by this therapeutic agent. She is the only case of which we have

CHART 7.

NAME S. D. 15 yrs.

DAY OF TREATMENT

GLUCOSE—MG. PER 100 C. C. SPINAL FLUID

ANTIMENINGOCOCCUS SERUM C. C.
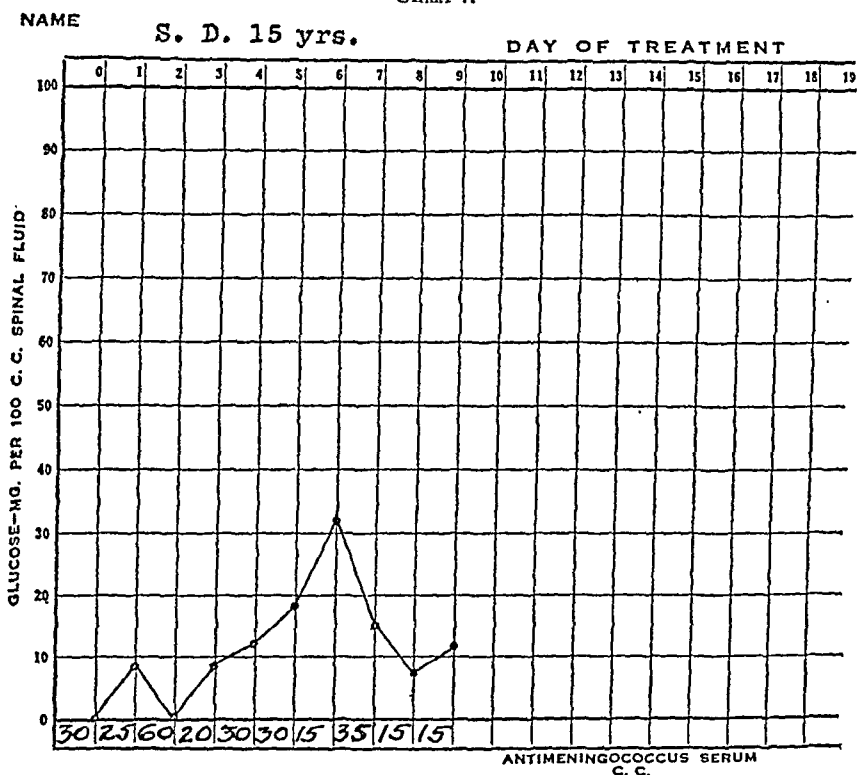
record in which the organisms were present on each and every examination of the spinal fluid. Chart V is taken from a fatal case that on admission seemed to be likely to recover. Needless to say, the symptoms at one time were not overwhelming and the cell count was not unduly high, but the patient had not received any treatment for seven days from the onset of the disease. There was an absence of glucose on the initial examination of fluid; the sugar concentration rose promptly to 30 milligrams per 100 cubic centimeters. Forty-eight hours later it had gone down to 0; it came up slightly, but did not obtain after this figures higher than 15.

Chart VI is that of a young colored woman, aged twenty, who on admission to the hospital was rational, had a total cell count in the spinal fluid of 29,000 and a leukocyte count of 8,500, who during the course of eleven days before her death had twenty cisterna and spinal punctures, receiving 585 cubic centimeters of serum. In this young woman the sugar content increased rapidly so that on the second day of treatment it was well within normal limits. The patient seemed to be getting along very well for the next seven days except for the fact that her sugar figures were descending daily. It

CHART 8.

NAME F. A. 16 yrs.
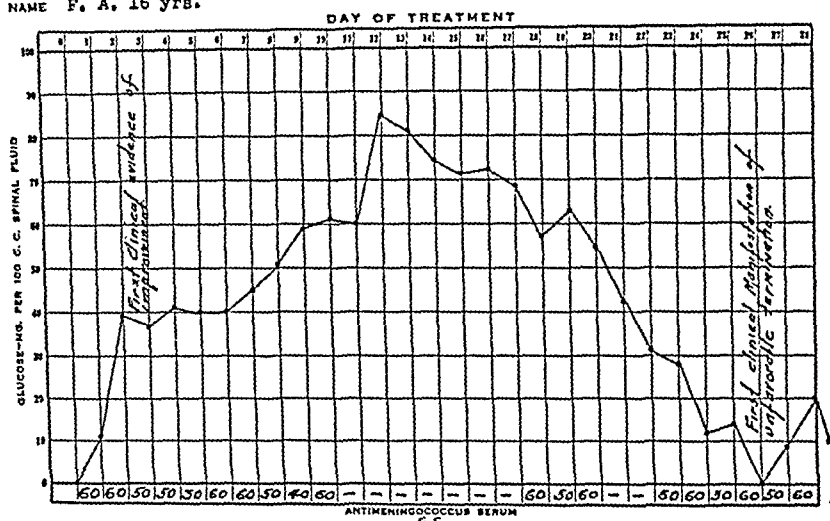
was not until several days before her death that her clinical condition seemed to change materially for the worse.

In Chart VII are shown the spinal-sugar determinations of a young colored individual, aged fifteen, whose cell count on admission was 3,000 and who spent nine days in the hospital before succumbing, receiving in the meantime 275 cubic centimeters of serum by both the cisterna and spinal routes. This patient's spinal sugar persistently remained below normal. The patient at no time evinced any evidence of recovery, however.

The next two charts represent the spinal-sugar determinations in two patients who apparently were recovering, had a recrudescence of the disease and who died. The patient in Chart VIII up until the twelfth day of the disease had what appeared to be a curve analogous to those in the patients who were not going to die. After

obtaining a very high figure for the spinal sugar the count gradually fell. For this reason specific therapy was not instituted. This represented one of our early cases and we did not appreciate fully the prognostic significance of this gradually falling spinal sugar. After being given serum for three days, the eighteenth, nineteenth and twentieth day of the disease, she seemed to be getting along so well that the serum again was stopped. The spinal fluid was practically clear and the clinical evidences of the meningitis had almost disappeared. Within the next forty-eight hours the sugar content again

CHART 9.

NAME A. J. 2 yrs.
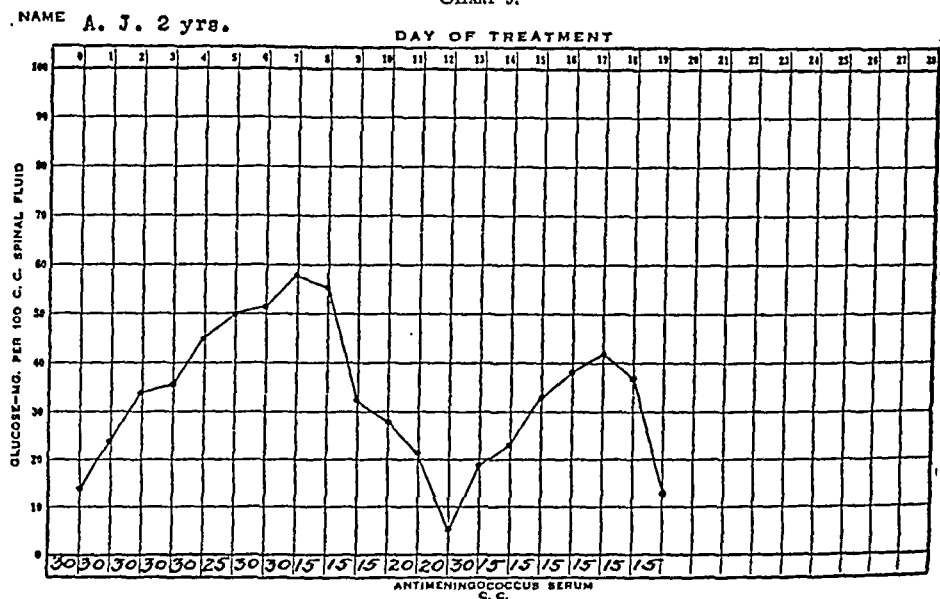
fell and kept on falling. Serum therapy was reinstituted actively and it was not until the twenty-sixth day of the disease that the patient exhibited clinical manifestations of an unfavorable termination. During the course of this patient's treatment a total of 1,033 cubic centimeters of serum was used.

In the case of A. J. (Chart IX), a small negro child of two years of age, who was admitted to the hospital four days after the onset of her symptoms with a cell count of 12,500 and a leukocyte count of 14,500, the spinal-sugar determinations showed a daily rise in the sugar content. This child seemed to be getting along very well and we believed she would recover despite the fact that the spinal-sugar concentration fell. It went up again to practically normal figures, but fell again and the child died after having twenty-six spinal and cisterna punctures with a total of 450 cubic centimeters of serum.

Chart X is a record of a five-months-old baby, R. O., who was admitted to the hospital on the twenty-third of March and discharged on the eighteenth of April, giving a story of having had convulsions, and with physical findings on admission indicating meningitis. The first count of the cells in the spinal fluid showed a total of 9,500 and the last spinal puncture showed only 75. This child had a leukocyte count of 22,500. Sixteen cisterna or spinal punctures were performed and 250 cubic centimeters of serum in all were given. The chart of the sugar content of the spinal fluid is

CHART 10.
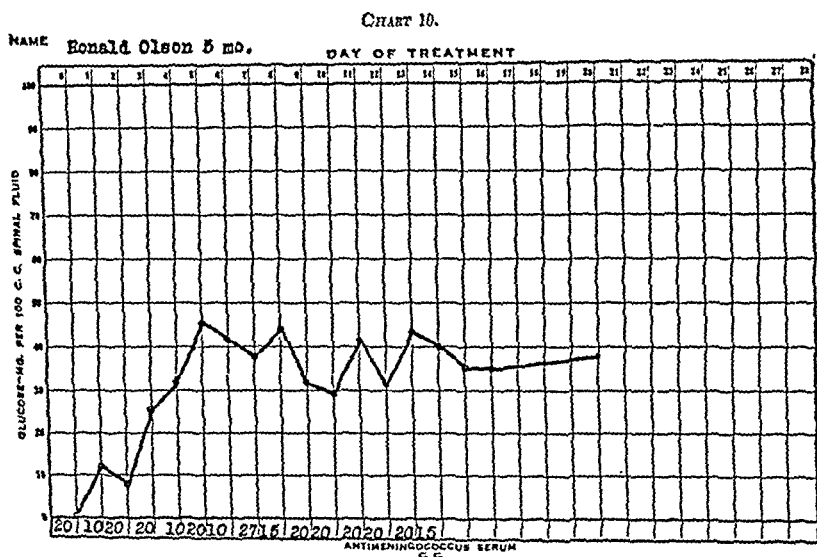
quite characteristic of those patients who recovered were it not for the fact that the sugar content was persistently low. It rose after four days' treatment to slightly above 40 milligrams per 100 cubic centimeters and remained somewhat below this figure, several times going as low as 30 despite the fact that the child recovered.

CONCLUSION

It is possible in certain instances to foretell the outcome, when patients are suffering from meningococcic meningitis, through clinical observation, but the most definite prognostic indication is a change in the sugar of the cerebrospinal fluid; failure of the sugar content to return to figures approximately normal being regularly followed by failure to recover.

PLEURISY WITH EFFUSION

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PLEURISY, like the poor, we have with us always; therefore, any development in its diagnosis or treatment must command our attention and interest. The following case is given somewhat in detail as it shows some deviations from the usual course of this disease, and gives me an opportunity to present some new features in investigation and management.

Mr. A. S., an office executive, aged fifty-eight years, was referred to me October 31, 1930. He was placed in the Baptist Hospital for investigation and treatment.

Complaint.—Underweight, weak, easily tired, short of breath, palpitation on exertion, persistent cough and much expectoration, especially in the morning.

Family History.—Irrelevant.

Personal History.—He is assistant general manager of a large office. His work is entirely indoors and practically never takes him out of the city or even out of the office building. He has indulged in no recreation, and almost no exercise; does not use tobacco or alcoholics; drinks about two cups of coffee a day. He is a bachelor, lives in a private home with some old friends, and has been in this home for sixteen years. The family is small and all are healthy. There is nothing else of interest.

Past History.—Had the usual diseases of childhood, and, in addition, diphtheria and scarlet fever in early life; typhoid and yellow fever when a young adult. Since then, his health has been excellent, until about eighteen years ago, when he begain to have chronic indigestion with epigastric discomfort, or actual pain, about two or three hours after eating. In 1915, he was operated on for peptic ulcer. This afforded some relief, but, continuing to have some indigestion, he consulted various physicians and tried out various plans of treatment without material success. In 1927, the gall-bladder was removed. Exact data as to conditions found at operation could not be obtained, but after this operation he experienced relief from the digestive disturbances.

Present Illness.—The history is rather vague and uncertain as to onset. Since the cholecystectomy in 1927, the alimentary function has been better, but he feels that he has never recovered his previous strength, and has been gradually losing weight. Some time after the operation, he began to experience, occasionally, peculiar pains described as shooting in character and involving the upper part of the left chest. In recent months, the loss of weight has been more rapid and the feeling of malaise has been more pronounced. He also became conscious of the fact that he was running fever, low grade and intermittent at first, but he thinks that it has been continuous for the past six weeks. For several months he has noticed a tendency to tire easily and to feel completely

exhausted after a day's work in the office. Four weeks ago he had his tonsils removed in an effort to rid himself of any possible focus of infection and because they showed some chronic disease. Shortly after this operation, all his symptoms became worse: fever became more pronounced and more continuous, intermissions less definite; he felt weaker; had more pains in his chest and considerable respiratory embarrassment; and he had a tendency to sweating, particularly when asleep. He began to expectorate thick, purulent material, but no blood. His anorexia increased and constipation became a disturbing factor.

Urinary History.—Negative.

Physical Examination.—This was negative except for the following:

1. *General Appearance.*—Fairly well nourished, well developed, stooped, and body inclined slightly to one side. The facies of advanced illness, the body being thin and the skin rather dry. Anemia was evident.

2. *Heart.*—Systolic murmur at apex (+). Blood-pressure, 115/82.

3. *Lungs.*—Persistent, medium, coarse râles at left apex. Evident fulness on the right side with limited expansion, dulness at the base and other evidences of pleural effusion.

4. *Extremities.*—Fingers showed clubbing (++).

5. *Temperature.*—102° F. This ranged from 99° to 103° during the first week in the hospital.

6. *Pulse.*—120 on admission. Ranged from 110 to 130 during this period. Respiration, 25 on admission; at times reached 50 per minute.

Laboratory.—1. Urine, negative, except indican (++), acetone (+). Occasional hyaline and granular casts. Occasional pus-cell.

2. *Blood.*—Erythrocytes, 3,810,000; hemoglobin, 55 per cent. (Talquist). White blood-cells, 8,750; neutrophils, 62; small mononuclears, 14; large mononuclears, 24; Wassermann, negative.

3. *Sputa.*—Showed the acid-fast bacilli, many pus-cells, etc.

4. *Gastric Analysis.*—Showed free hydrochloric acid, 0, combined, 12; otherwise negative.

Other laboratory work practically negative.

X-ray Report.—"Old, partially healed, bilateral tuberculosis, most marked in upper left lung; extensive bilateral fibrosis; increased density involving base of right chest, suggestive of fluid; extensive pleuritic adhesions present."

Aspiration.—Revealed a fairly large amount of amber-colored fluid of which about one liter was removed at first operation. Specimen sent to laboratory for study.

A diagnosis of bilateral pulmonary tuberculosis and pleurisy with effusion was made. I might say here that the patient later developed tuberculous enteritis and that the outlook is correspondingly more unfavorable.

SPECIAL FEATURES

Testing Thermometers.—The patient, on presenting his temperature chart, was asked to submit his thermometer for testing. It was found that the instrument that he had been using was 0.6° F. above normal.

I make it a practice to purchase the best thermometers that I can

obtain, selecting those that can be easily shaken down. I buy about one-half dozen of these at a time and send them on to the Bureau of Standards at Washington for standardization. The cost for this service is only a few cents each. I never accept a temperature chart from a patient without testing the thermometer used, and in nearly a third of the thermometers presented I find a deviation from the normal sufficient to be of clinical significance. These deviations are practically always in the form of a higher reading. This inaccuracy is supposed to be due to the instrument having been finished and put on the market before the glass was thoroughly seasoned (several years). The minute contraction that takes place in the glass has the result of forcing the mercury upward. My testing is done by putting a correct thermometer together with the patient's thermometer under the patient's tongue for five minutes, then comparing the readings. Checking this test by using two correct thermometers has shown it to be almost absolutely accurate in a large number of cases.

In one private hospital which bought one special make of thermometers for ward service, I found so large a percentage of defective instruments that the entire stock of thermometers of the hospital was discarded, and a new supply of a different make was purchased. The average variation was found to be almost 0.5° F.

Blood-pressure Readings.—When first taken, early in the first examination, this was found to be 136/90. Following our usual custom, another reading was taken at the close of the examination, and this was 115/82. A new patient, on first examination, especially if he is very apprehensive as to the results of the investigation, is apt to show an elevation that will disappear under the soothing influence of kindly, diplomatic handling during the course of the consultation. I have accumulated data on over one thousand cases that demonstrate this reaction in rather a striking way.

Palpation of Pulmonary Apices.—While unilateral impairment of apiceal expansion was tested by the various methods, its degree was best shown when the examiner stood or sat back of the patient and placed his fingers high up in the axillary areas on each side. The tips of the fingers were allowed to rest in the highest intercostal spaces that could be conveniently reached. The hands were held on the skin and movement prevented by the position of the palms and thumbs. As the patient breathed in and out, the ribs moved under

Fig. 1.

Demonstrating unilateral impairment of apical expansion.

Fig. 2.

Front view. Measuring both sides of the chest at the same time.

Fig. 3.

Back view.

FIG. 7.

Showing position for aspiration of chest.

FIG. 8.

Showing a *special* aspirating outfit.

the examiner's finger-tips—a half rib width on the right and one and a half rib's width on the left. (See Fig. 1.)

Mensuration of the Chest.—The measurements around the chest were found to be:

Around the Chest at Nipple Line

At rest	Right 48.0 centimeters	Left 43.5 centimeters
On inspiration	Right 48.5 centimeters	Left 47.0 centimeters
On expiration	Right 47.5 centimeters	Left 42.0 centimeters

Over the Shoulders

On inspiration	Right 60.0 centimeters	Left 60.5 centimeters
On expiration	Right 59.5 centimeters	Left 58.5 centimeters

It will be noted that the side with effusion is larger in measurements around the chest but moves less during the respiratory cycle. The shoulder measurements are practically the same, but again the diseased side shows less movement. The shoulder measurements were influenced somewhat by the habitus of the patient.

A special measuring device was used. This consists of two pieces of tape attached to a common center and leading out in each direction. These are hinged to permit a variety of uses. The center piece is held in the mid-sternal line and the readings taken where the ends cross the blue pencil marks in the back (see Figs. 2 and 3).

The value of data as to the comparative size and movements of the two sides of the chest is indisputable. The difficulty has been to obtain correct measurements. With the common tape, each half of the thorax must be measured separately, and it is obviously impossible that inspiration and expiration should be exactly the same during different respiratory cycles. By the use of the tape this element of error was eliminated.

X-ray Examination of the Chest.—The physical examination revealed the probability of fluid being present on the right side. A careful investigation was made to determine the apparently most favorable site for aspiration. A lead marker was then placed on this spot by a strip of adhesive and the roentgenogram made (see Fig. 6).

We were then able to determine whether or not the proposed site for aspiration was really the best. In subsequent X-ray pictures, each previous puncture wound was covered by a lead marker so that the best site for the next puncture would be indicated. In order to

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each previous puncture wound was covered by a lead marker so that
the best site for the next puncture would be indicated. In order to

make this evidence more conspicuous, a special lead marker was used (see Fig. 6).

Aspiration.—This procedure was carried out in the usual way except that the patient, instead of sitting up, lay on his well side, with the side to be aspirated uppermost. His upper hand was raised above his head and he grasped one of the metal bars of the bed (see Fig. 7).

This position has the following advantages:

1. It places the patient in a comfortable position and favors relaxation.

2. It widens the intercostal spaces as much as is possible, thereby making the introduction of an instrument easier.

3. Grasping some steady object has possibly some psychic advantage.

4. The recumbent position lessens the tendency to shock or other unfavorable developments.

5. Should these occur, the patient does not have to be helped to his bed or even laid down, but is already in the best possible position for attention.

6. As the patient's face is turned to the wall when the instrument tray is brought in, he does not see it, and the possibility of excitement and loss of control is certainly lessened.

Aspirating Outfit.—The one shown in use here (Fig. 8) consists of:

1. Two graduated bottles.

2. A Potain aspirator, in which all connections have been replaced by those of the Luer type.

3. A Luer trocar and cannula, so made that a shoulder does not present where the point of the trocar projects beyond the tip of the cannula.

4. A twenty-cubic-centimeter Luer glass syringe.

Luer connections on the Potain outfit admit of a larger and better selection of needles, and of trocars and cannulas. Also, a Luer glass syringe may be used should the fluid be too thick for the Potain suction apparatus to remove it, or should the cannula become stopped. Two bottles are used to avoid delay should one become filled or the suction effect of one become insufficient.

HEMOPTYSIS IN CONGENITAL AND ACQUIRED HEART DISEASE

By GEORGE HERRMANN, M.D.

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THE spitting or coughing up of blood is so common in, and so much a part of, pulmonary tuberculosis that the mere mention of the symptom of hemoptysis suggests the usual diagnosis. Diagnosticians recognize the fact that certain types of heart and vascular disease, especially mitral stenosis and aneurysms of the aorta, may present hemoptysis as an outstanding symptom. Congenital interventricular septum defects, so far as I know, have not been especially commented upon as causing hemoptysis and pulmonary findings suggestive of tuberculosis. Even though not the rule the facts must not be lost sight of. With this in mind I will cite a few striking cases in which hemoptysis was due to congenital as well as acquired heart disease and discuss the pathologic physiology, the clinical picture, the management and the response in each of these types.

The tentative admission diagnoses of pulmonary tuberculosis in these cases, had been in error as is almost invariably the case. Such errors, however, are not so glaring as might appear on first thought, for besides the symptom of hemoptysis which is much more frequently a presenting disturbance in the cardiac patient than it is in the usual case of tuberculosis, there may be extensive lung findings which on physical examination strongly suggest parenchymatous pulmonary exudative processes. Frequently also roentgenograms of the chest will show changes which may be interpreted as infiltration. These latter findings are as a rule merely an exaggeration of the bronchovascular tree, the result of chronic increased pulmonary blood-pressure. Secondary fibrous changes producing a cirrhosis of the lung similar in its pathogenesis to cardiac cirrhosis of the liver may occur from the chronic passive congestion of the pulmonary system. Extreme congestion may cause the appearance of exudate. Mechanical pressure on the return circulation due to the enlarged left auricle, may cause defective venous drainage of the left apex

progress is to be expected along with repeated episodes of hemoptysis with every unusual effort and its concomitant rise in blood-pressure.

CASE II.   CONGENITAL HEART DISEASE, DEFECTIVE INTERVENTRICULAR SEPTUM WITH
SLIGHT CONUS STENOSSI, POLYCYTHEMIA, CYNOSIS, COUGH, HEMOPTYSIS
AND CHRONIC ACTIVE PULMONARY CONGESTION

J. R., a white schoolboy of sixteen years, was brought to the hospital to be examined for tuberculosis, primarily because his mother had been under treatment for pulmonary tuberculosis. On admission the boy was averse to giving any history that might suggest the possibility of pulmonary tuberculosis. At first he denied all symptoms. Later, after being assured that he apparently did not have tuberculosis, he admitted that he had had a more or less chronic cough and expectoration of frothy material which was occasionally slightly blood-tinged, and some shortness of breath on exertion. The symptoms had been present all his life as far as he knew and some blueness of his face and ears had always been present. Violent effort or exertion of any type increased all of his symptoms, especially his shortness of breath and his cyanosis.

He had had no other respiratory symptoms, no pain in the chest, no night sweats, no loss of appetite or weight. He had had smallpox at the age of twelve but no other illness. He denied all knowledge of venereal disease by symptoms as well as by names. His family history was poor in that his mother apparently had pulmonary tuberculosis to which he has been exposed for a long period of time. His father and brothers were in good health, two brothers were dead of unknown causes. One of the brothers who was dead had had a chest deformity similar to the patient's. His social history was significant in that he had probably been more or less constantly exposed to tuberculosis.

Physical Examination.—The boy was thin and emaciated, 66 inches tall but weighing only 110 pounds. He was distinctly of a phthisical asthenic habitus. There was slight scoliosis toward the right with the apex of the curve at about the fourth dorsal vertebra. There was distinct depression of the midsternum and lower sternum with the xiphoid process projecting forward at about right angles producing the so-called shoemaker's hollow chest. There were no other signs of old rickets, no square-headedness or bowleggedness. The patient was distinctly round shouldered and walked somewhat stooped over. The cervical glands were palpable in both anterior and posterior chains. The left pupil was slightly larger than the right. The ears were cyanosed. The nose and mouth showed engorgement of the mucous membranes. The tonsils were slightly engorged.

The expansion of the chest was somewhat limited but equally so on both sides. The tactile fremitus likewise was somewhat slightly exaggerated. No friction rub or tenderness was brought out. Pulmonary resonance was slightly decreased. The apices were fairly clear. The percussion of the chest was made difficult by the deformity that was present. The resonance of the apical isthmi was not definitely encroached upon, as the deformity apparently was lower than normal because of the shoemaker's chest, the slight secondary emphysema produced resonance throughout the chest. The breath sounds were slightly exaggerated but were nothing more than puerile in character, in most areas.

The pulse was somewhat rapid, averaging about 100, but the rhythm was regular. The systolic activity of the heart was visible and palpable in the midsternal line just below the ensiform cartilage. The maximum apex impulse was only 6 centimeters to the left of the midsternal line. A long

Fig. 1.
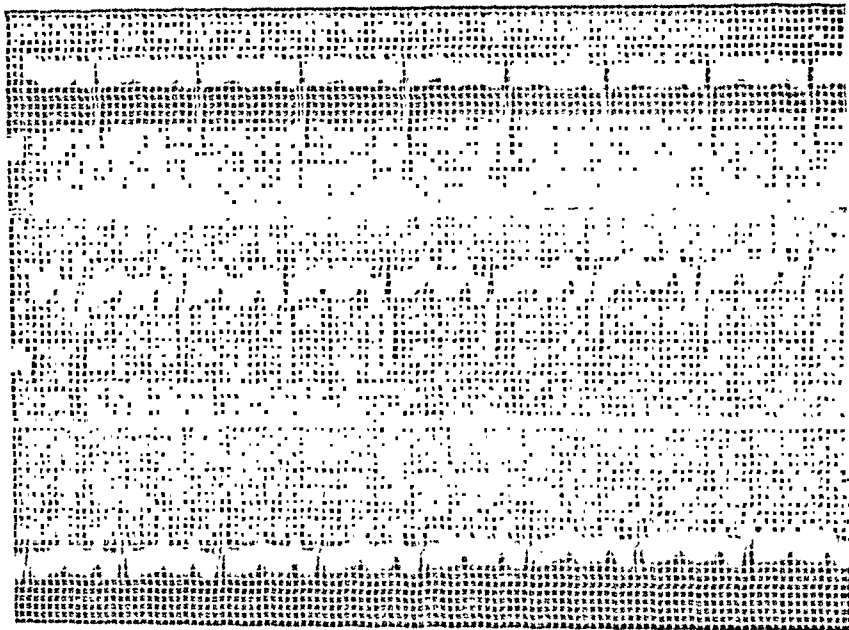
Electrocardiograms on Case I, showing pathognomonic extreme right ventricular predominance of congenital heart disease.

Fig. 2.

Teleroentgenograms on Case I, showing great increase in the markings and exaggerations of the bronchovascular tree.

FIG 3.
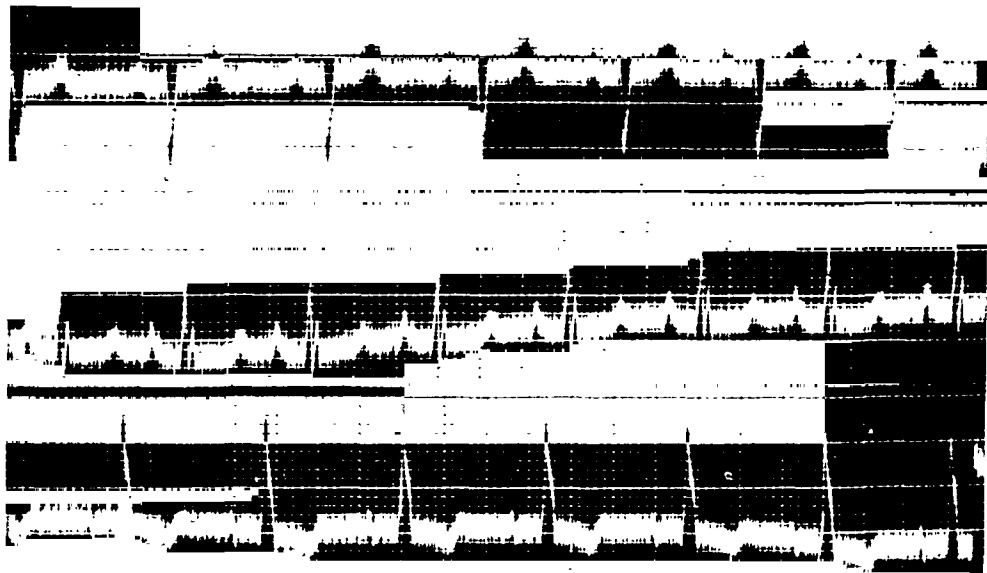
Electrocardiograms on CASE II.

FIG. 4.

Teleroentgenograms on CASE II.

systolic thrill was felt over the mitral area propagated up into the chest over the precordium and to the right. No shocks were noted. The cardiac outline extended about seven centimeters to the left and 3.5 centimeters to the right of the depressed midsternum. A loud, harsh systolic murmur was heard with maximum intensity in the fourth intercostal space and transmitted in all directions but especially to the right and into the pulmonary area where the second sound was accentuated. There was definite cyanosis and clubbing of the fingers and toes. The liver and spleen were not palpable and there was no ascites or other abnormality noted in the abdomen.

The electrocardiograms (Fig. 3) showed extreme right ventricular preponderance which is usually found in cases of congenital heart disease. The heart rate was slightly over 90 per minute and P3 was negative. Distinct deep notching was present on the down stroke of R-2 and R-3.

On the teleoroentgenograms (Fig. 4) the measurements of the heart shadow showed a transverse width of the great vessels of 5 centimeters. The aortic hemicircle measured 3 centimeters. The total transverse diameter of the heart was 11 centimeters, the longitudinal diameter was 12½ centimeters. The transverse diameter of the thorax measured 20 centimeters. The roentgenogram was reported by the roentgenologist as showing considerable hazy peribronchial infiltration in the upper zone of both sides, slightly more marked on the right side. This he considered as probably the result of a tuberculous infection. This was, however, very much of the same type that was found in the first case and may well be the result of the active pulmonary congestion incident to the interventricular septum defect in the heart. The patient improved considerably on rest in bed, all symptoms disappeared and he was discharged to his home with directions on how to live and conduct himself. It was especially stressed that he limit his physical activities.

CASE III. RHEUMATIC MITRAL STENOSIS AND INSUFFICIENCY WITH SECONDARY
PULMONARY SUFFICIENCY, CHRONIC LUNG CHANGES,
COUGH AND HEMOPTYSIS

J. M., a plumber, aged thirty-one, came into the hospital because of persistent cough and spitting of blood. His trouble had begun on New Year's Eve, 1930, when after going out into the cold air he was taken with severe paroxysms of coughing, following which he spat up approximately four ounces of blood. At two o'clock in the morning of January 1, 1931, he had another coughing spell which was followed by the expectoration of about four ounces of blood. This recurred once each day and the sputum continued to be slightly blood-tinged, until January 3, 1931, when he entered the ward because of the persistence of cough and of hemoptysis and a feeling of weakness. He had chilly sensations and felt feverish at times. Hemoptysis had been present on previous occasions but had never been so marked nor had it been so persistent. The cough with considerable expectoration had been present for about a month before the attack of hemoptysis. He had severe night sweats and sensation of fatigue and vertigo after coughing. He had noted some shortness of breath on swimming for some time. His appetite had been good but he had lost about twenty pounds of weight within a year. He denied ever having had rheumatic fever in any of its manifestations, growing pains, arthritis, chorea or tonsillitis. He had had no scarlet fever, diphtheria, or pneumonia. He had had a mild attack of influenza in 1920. He denied venereal infection.

Physical examination revealed a rather tall, thin, Spanish-American of an asthenic habitus, in a rather poor state of nutrition, hollow cheeked, with, however, fairly heavy musculature of the arms as a result of his occupation as a plumber. He was 66 inches tall and weighed 130 pounds.

The cervical glands were distinctly enlarged. The tonsils were inflamed and covered with scar tissue. The body temperature was normal but the respirations were increased in rate.

The apex impulse of the heart was sharply localized in the fifth interspace 9 centimeters from the midsternal line. A long diastolic and a shorter systolic thrill were felt over the apex. A diastolic shock was present in the pulmonary area. The heart on admission was slightly increased in rate, averaged about 90 beats per minute and was regular. A loud, long, rumbling diastolic murmur ending in a snapping first mitral sound following which there was a loud, blowing systolic murmur heard on auscultation over the apex. The pulmonary second sound was accentuated and followed by a high-pitched diastolic murmur which was transmitted down along the sternum but was not heard in the aortic area. There were no peripheral phenomena of significance and the blood-pressure was 110 millimeters of mercury systolic, and 80 millimeters of mercury diastolic. The pulse was small.

The chest expanded symmetrically. Tactile fremitus was increased posteriorly in the interscapular regions. The breath sounds, especially expirations, were exaggerated and prolonged in the apical regions posteriorly. Transient crepitant râles were heard throughout the lungs, but these disappeared after the first day in the hospital just as the hemoptysis subsided.

The abdomen was scaphoid, no organs were palpable and no tenderness was elicited. The finger tips were slightly thickened and the nails were of the watch-crystal type.

<center>COMMENTS</center>

The patient's chief symptoms, his hemoptysis and especially the cough, subsided promptly after rest in bed. A slight upper respiratory infection had been an exciting and aggravating factor. Once the cough started, a vicious circle was initiated for every coughing paroxysm caused a rise in the already increased pressure in his pulmonary artery and the whole pulmonary system. Further engorgement caused exudation into the bronchioles but the chief source of trouble is the further irritation of the left recurrent laryngeal nerve which is pressed upon between the aorta and the pulmonary artery. Occasionally this goes so far as to produce paralysis of the left vocal cord with hoarseness and aphonia as well as an intractable metallic cough. Cough is one of the most severe strains that can be put upon a cardiovascular system. The hemoptysis which often results is a safety valve effect for the relief of the overcongested state of the pulmonary capillaries.

The electrocardiograms (Fig. 5) showed prominent broad P waves in all leads. There was slight notching of the P wave. No definite right ventricular predominance was present as is usually the case in mitral stenosis.

The roentgenogram (Fig. 6) showed a cardiac shadow that was greatly enlarged, measuring 15.5 centimeters across with a longitudinal diameter of 17.5 centimeters. The great vessels measured 5 centimeters in the second interspace. The chest diameter was 26 centimeters. The region of the pulmonary artery and that of the left auricle were especially prominent. The right border

Fig. 5.
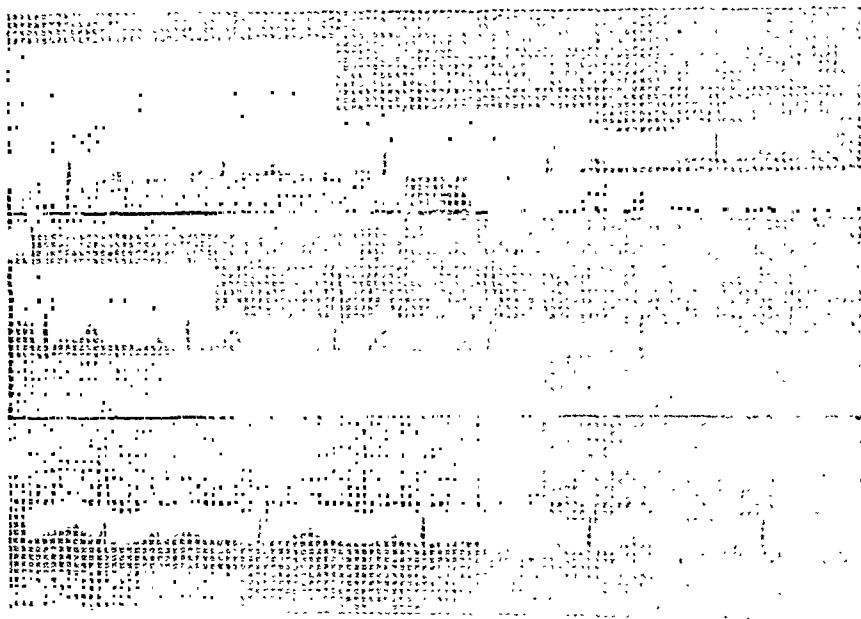
Electrocardiograms on CASE III.

Fig. 6.
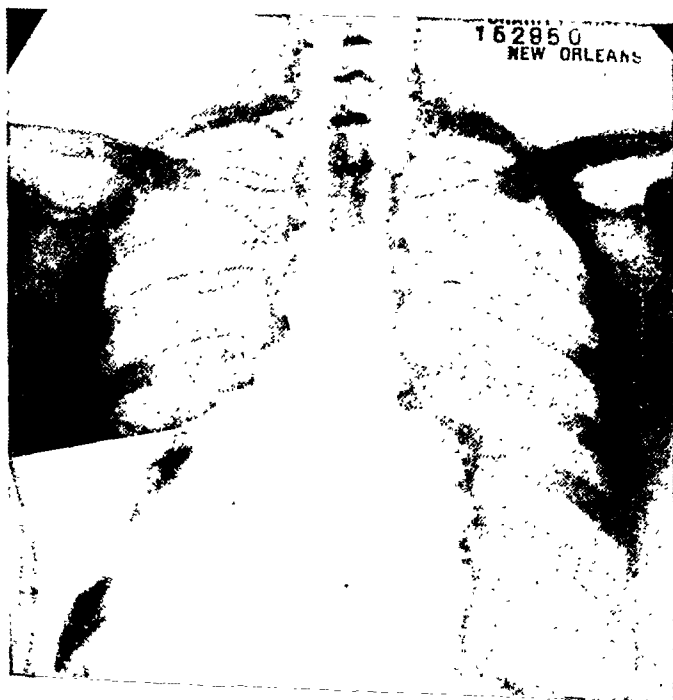
Teleroentgenograms on CASE III.
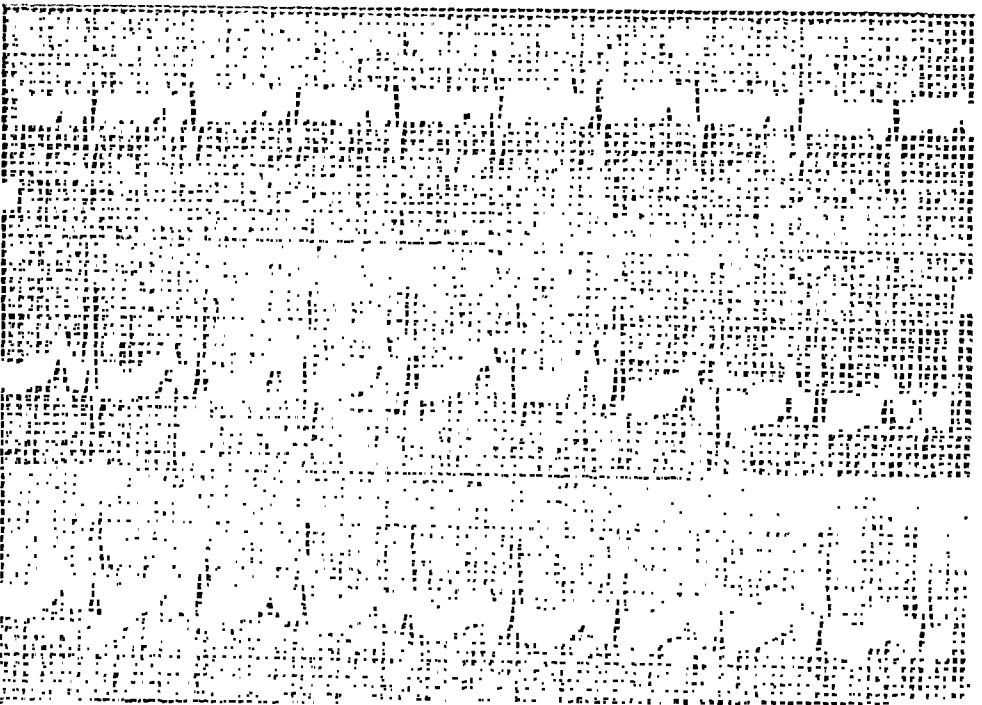
Electrocardiograms on CASE IV showing the characteristic right ventricular predominance and exaggerated P waves, the signs of high-grade mitral stenosis.

FIG. 7B
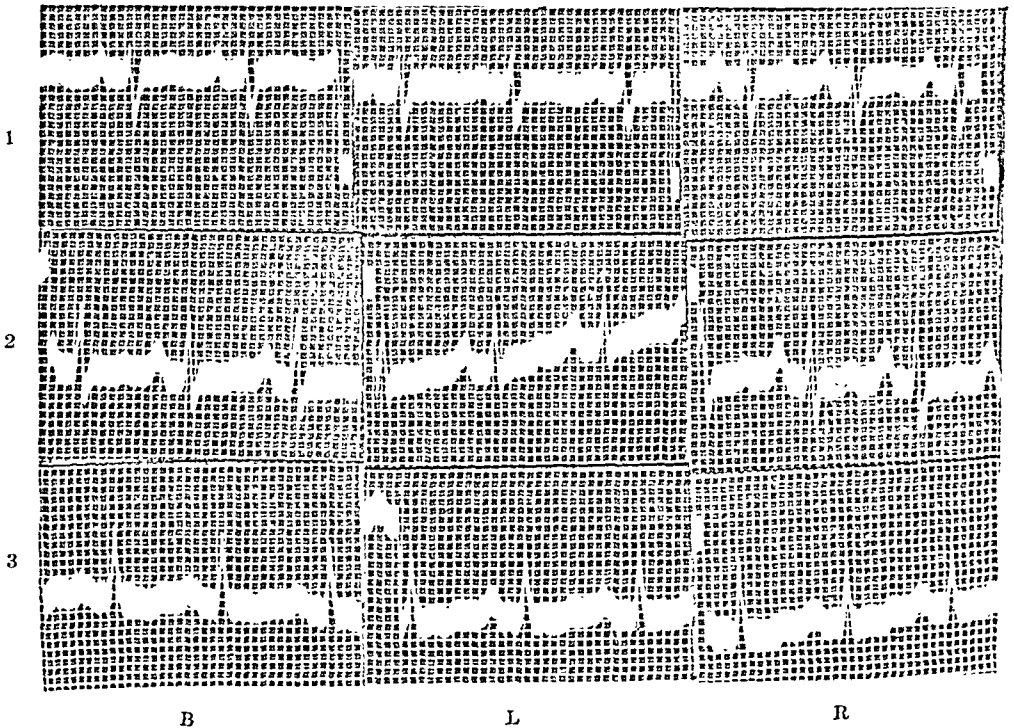
Electrocardiograms in the three positions, B, L and R, on back, on left side and on the right side. All three sets in all three leads are almost identical, indicating an absence of shifting of the electrical axis which indicates a fixation of the heart, probably the result of chronic adhesive pericarditis.

made up of the right auricle suggested considerable engorgement of this chamber. There was an extreme degree of increase in the lung markings, especially in the hilar regions. This the roentgenologist thought was probably due to the heart disease.

CASE IV. EXTREMELY HIGH-GRADE MITRAL STENOSIS AND INSUFFICIENCY, CHRONIC PERICARDITIS AND A TEMPORARY RELATIVE PULMONARY INSUFFICIENCY PRESENTING FEVER, TACHYCARDIA AND HEMOPTYSIS

A young Italian farmhand, aged eighteen years, was sent to Ward 214 in Charity Hospital because of persistence of hemoptysis, fever and tachycardia. He dated his trouble from an exposure two months previously when he was caught in a cold rain and considerably chilled. Following this he had a cough and a little fever. His cough persisted and was exaggerated when he returned to his work in the strawberry fields which required much stooping. While doing this he was taken with a paroxysm of coughing which caused him to spit up considerable amounts of blood, enough to fill three towels according to his story. His heart rate rose rapidly to between 110 and 130 per minute, sometimes even to 140. The doctor put him on digitalis medication and put him to bed. Spitting of blood decreased but the heart rate remained high. The fever ranged between 102° and 99° F. Palpitation was considerable. He noticed also slight shortness of breath and some palpitation on exertion. All of his symptoms, however, had been of recent onset.

He admitted that at the age of fifteen, three years before admission, a cursory examination by a doctor who was attending another member of the family resulted in the diagnosis of heart disease. The doctor told the patient to have his tonsils removed because they were damaging the heart. This he had done. He insists, however, that he had had no sore throats, no chorea, acute arthritis or growing pains or other manifestations of rheumatic fever and no symptoms whatsoever until the present disturbance began six weeks before admission. He admitted having had measles, whooping cough and influenza but had nothing to suggest complications in any of them.

The *physical examination* revealed a tall, thin, distinctly emaciated boy of eighteen years. He was nervous and quite anxious about his condition and distressed even while at rest. The patient was slightly orthopneic. His skin was quite pigmented but pale except for the lips which showed a tinge of cyanosis. Respirations were rapid, the heart rate averaged 140 per minute and his temperature on admission was 102° F. This dropped to 99° F. and then to normal within twenty-four hours, apparently as a result of salicylate therapy.

The neck was long and thin, the chest likewise was long and narrow with a bulging over the precordium. The point of the maximum impulse of the apex beat was in the fifth interspace just inside the midclavicular line. There was a distinct systolic retraction of the precordium and the epigastrium. Palpation confirmed the findings and revealed the powerful apex impulse which was sharply localized in the fifth intercostal space 11 centimeters to the left of the midline. The cardiac apex impulse was more or less fixed in position and did not shift with change in position. The shock of the accentuated first sound was felt with each systole and a thrill for the most part diastolic in time but apparently also extending somewhat into systole was present over the apex impulse. At the base a distinct pulmonary diastolic shock of pulmonary second accentuation was

present. On auscultation a low, rumbling murmur filled most of the diastolic period at the apex. A slight systolic murmur was also heard at the apex whence it was transmitted to the axilla. The mitral first sound was sharp and snapping, the pulmonary second sound was of similar quality but short and followed by a definite, high-pitched, diastolic, Graham-Steele murmur. No murmurs could be heard in the aortic area. The blood-pressure was 110/70. The heart was definitely abnormal in outline and definitely enlarged. The transverse diameter of the heart was 14 centimeters and the retromanubrial dulness was 5 centimeters. There was a definite increase of the dulness in the left auricle and pulmonary artery region.

The chest showed slight upper dorsal kyphosis and some scoliosis. Some harshness of the breath sounds was noted in the left apex and in the left scapular regions. Crepitant râles were heard at the bases posteriorly. The vital capacity was 1,700 cubic centimeters on one occasion and 2,000 cubic centimeters on another.

The abdomen was flat, the liver and spleen were not palpable. The skin of the extremities was pale but otherwise not abnormal. The blood showed secondary anemia; 70 per cent. hemoglobin; 4,380,000 red blood-cells; 13,500 and later 7,500 white blood-cells per cubic millimeter, and of these there were: small mononuclears 14, large mononuclears 3, eosinophiles 1, basophile 1 and neutrophiles 81 per cent. The blood Wassermann was negative. The blood culture was negative. The urine showed a slight trace of albumin and an occasional cast. The P.S.P. was 50 per cent. the first hour and 35 per cent. the second hour. The other evidences of renal irritation cleared up.

The electrocardiograms (Fig. 7A) showed a sinus tachycardia with a rate of 130 per minute, a conspicuous right ventricular predominance with a prominent P-2 and P-3 wave and a negative P-3. These electrocardiographic findings are diagnostic of mitral stenosis. Taken in the three positions the electrocardiograms (Fig. 7B) showed practically no shift. This strongly suggests a fixation of the electrical axis from which one might infer that the anatomical axis was also fixed due to the presence of pericarditis.

The roentgenogram (Fig. 8) of the chest showed considerable haziness throughout both lung fields with an extreme exaggeration of the bronchovascular tree and exaggeration of peribronchial infiltration. The heart was greatly enlarged and of the mitral type with considerable dilatation at the root apparently due to pulmonary artery changes; enlarged almost to the point where it could be termed aneurysm of the pulmonary artery. The hilar shadows were enormously exaggerated. The shadow of the great vessels measured 6 centimeters in the second interspace and 7 to 8 centimeters in the third intercostal space. The transverse diameter of the heart measured 14.6 centimeters, the longitudinal diameter 15.5 centimeters. The transverse diameter of the chest was 28 centimeters. The abnormalities of the cardiac shadow were so striking as to make the diagnosis of mitral stenosis quite certain. This would account for the clinical picture as well as the abnormalities of the lung field. The extreme degree and the chronicity of the passive congestion had apparently produced considerable fibrosis.

<div align="center">COMMENTS</div>

The Course of the Case.—With rest in bed and salicylate therapy the fever dropped to normal within twenty-four hours, the pulse rate decreased to about

FIG. 8.
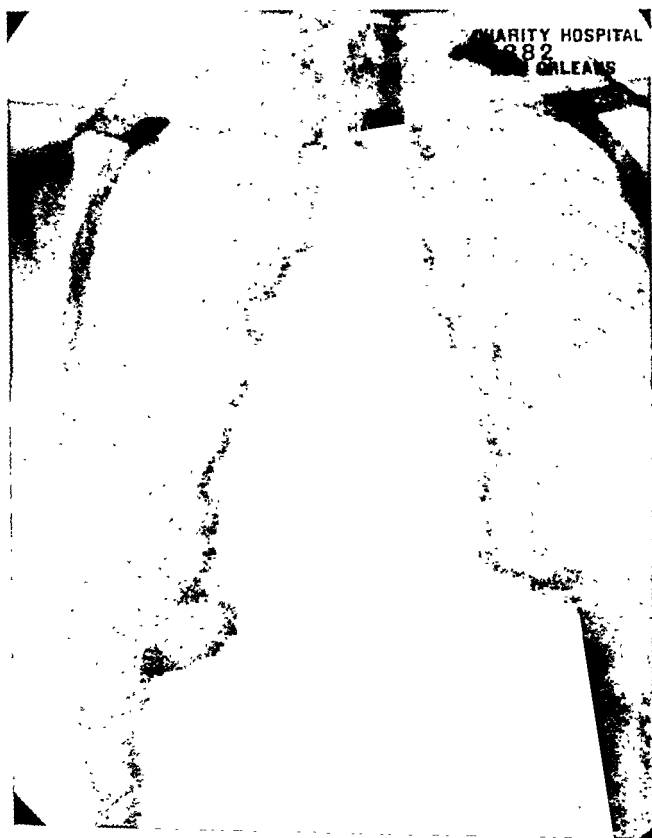
Teleroentgenograms on CASE IV.

110, the hemoptysis decreased and finally disappeared entirely, the chest signs cleared up. Of considerable interest is the fact that the high-pitched basal diastolic murmur which was heard at the left of the sternum and interpreted as evidence of relative insufficiency of the pulmonary ring became less and less distinct and finally disappeared entirely. This suggested that with the rest and dropping of the peripheral pressure the intrapulmonary pressure likewise decreased and the pulmonary insufficiency disappeared. The presence of a rather sharply accentuated pulmonary second sound P-2 with a diastolic murmur in this region may be accounted for just as we may account for similar phenomena in the aortic lesion where there is chiefly ring dilatation and weakness of the wall which when exposed to the extreme pressure following the sharp closing of the valve yields, producing a slight relative insufficiency. The patient apparently had acute exacerbation of his old rheumatic infection and probably also a flare-up of the old valvulitis.

The physical findings were those due to chronic valvulitis, fibrosis and mitral stenosis of a very high grade. The pathologic physiology of this mechanic defect and obstruction is well known. The back pressure of the blood from the obstruction at the mitral orifice dilates the left auricle and the pulmonary veins, thus passively engorging the lung. The increased intrapulmonary pressure is transmitted back through the capillary bed and into the pulmonary artery and finally reflected against the pulmonary valves and the right ventricle. The right ventricle struggles against this increased intrapulmonary pressure and forces the venous blood through the congested pulmonary system. Occasionally the pressure in the pulmonary artery becomes so high that it is able to dilate the ring and produce a temporary safety-valve action of a pulmonary insufficiency. Congestion, engorgement and anoxemia lead to the deposition of blood pigment, degeneration of capillary walls, extravasation of blood or diapedesis of red cells, cellular reaction and secondary fibrosis.

DISCUSSION IN GENERAL

Four cases have been presented which have in common symptoms and signs which strongly suggest the diagnosis of pulmonary tuberculosis. This diagnosis is ruled out with difficulty in some of the cases in spite of the findings of heart lesions, defective interventricular septums and mitral stenoses, which would adequately account for the symptoms and signs. Especially is this so also when an intercurrent upper respiratory infection may be incriminated as giving rise to the fever. The pathologic physiology of the lesions and the *modus operandi* of the symptom production have been described in the comments in each type of case, namely Cases I and III.

The most strikingly confusing findings were those in the lungs, which were the result of the chronic pulmonary congestion active as well as passive in its inception. Cyanosis and anoxemia were probably factors in the production of the hemorrhages but the sudden

increases in pressure in the engorged pulmonary system as a result of coughing or exertion seem to be the decisive precipitating factors. Physical strains cause the systemic blood-pressure to rise but the concomitant demand for increased oxygenation requires increased pulmonary blood-pressure and circulation.

The disappearance in all cases of symptoms and some of the signs on rest in bed was in part due to the subsiding of the inter-current acute respiratory infection with its bronchial irritation and the consequent alleviation of the reflex cough. Infection with fever and especially cough must be considered most common precipitating factors in acute congestive cardiac failure. These are known to have been present and active in all of these cases. The fall of the systemic blood-pressure and also of that in the pulmonary system along with the reduction of the metabolic rate to basal levels incident to the rest in bed tended to create the conditions most ideal for recovery, those with the lowest demands upon the circulation.

Most interesting to the clinicians were the decrease and the final disappearance of the Graham-Steel murmurs of relative pulmonary insufficiency in the two cases of high-grade mitral stenosis during the period of rest in bed. Such a change in a basal pulmonary systolic murmur is most suggestive of the relative or functional character of the semilunar valve incompetency. The pulmonary artery being thin walled is more prone to such changes than is the aorta. The preserving of the snapping pulmonary second sound is further evidence that the regurgitation is secondary to high-pressure dilatation of the pulmonary ring following upon the closure of the valve cusps which snap together only to be drawn apart by the increasing pressure and dilatation of the root of the pulmonary artery.

The roentgenographic findings too warrant further emphasis. The roentgenologist has shown that chronic heart disease may produce chronic lung disease. Much of what is seen to mottle the roentgenograms may be merely the congestion, but a goodly part of it may be fibrosis as a result of chronic changes. It is not usually realized how extensive such fibrosis may be. In a small series of some six cases of high-grade mitral stenosis that I have seen in the last few years I have been struck by the degree to which pulmonary fibrosis that can develop in these cases. There was actually a

cirrhosis of the lung with such an infiltration of fibrous tissue that the lungs would hold their form and practically stand when placed upright. The tissues were distinctly tough on section and showed microscopically much fibrous tissue.

These findings are of interest not only because of producing the physical and roentgenographic signs of pulmonary tuberculosis but also because of the significant interference with the already hampered pulmonary circulation. May it not be possible that these secondary and attempted protective and compensatory changes may contribute in no small measure to the ultimate overwhelming of the right heart and the inevitable congestive failure? Here pulmonary edema intervenes evidently as a sign of primarily right ventricular failure and the patient drowns in his own transudate.

There has been no opportunity afforded in our service for the histologic study of the lung changes incident to congenital defects of the interventricular septum. Under such circumstances the congestion is from the arterial side from the right ventricle to begin with and is therefore considered to be an active congestion. The admixture of venous blood with cyanosis and anoxemia and polycythemia must be recognized as playing an important secondary rôle.

SUBACUTE BACTERIAL ENDOCARDITIS (PNEUMOCOCCAL) ENGRAFTED UPON PREËXISTING SYPHILITIC VALVULAR DISEASE*

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THE rarity with which the lesions of infectious endocarditis (endocarditis lenta, subacute bacterial endocarditis) have been found in heart valves previously damaged by syphilis has been repeatedly commented upon. Thus Libman[1] has said, "It is interesting to note that the subacute bacterial infections occur mainly on the basis of valvular defects due to the rheumatic virus and much less in other types, notwithstanding the great frequency of syphilitic valvular defects." This infrequency of the combination of endocarditis lenta and syphilis is all the more remarkable because the aortic valves, the favorite site of syphilitic infection, are also the ones most frequently attacked by the bacterial endocarditis. Blumer[2] found in 146 cases of subacute bacterial endocarditis, mitral disease in 39 per cent., aortic disease in 10.8 per cent., and mitral-aortic in 38.3 per cent., aortic and tricuspid disease 2 per cent., aortic and pulmonic disease .6 per cent., mitral, aortic and tricuspid disease 2.7 per cent. That is to say, the aortic valves were involved in 54.4 per cent. In 271 clinical records, similarly, he found evidence of aortic valvular disease in 48.2 per cent. Pineles[3] states that endocarditis lenta attacks by preference the aortic valves. Morawitz[4] found aortic insufficiency in the majority of his cases, and in nine cases the aorta alone was attacked. Curschmann[5] found combined valvular defects with the involvement of the aortic valves preponderant. Auerbach[6] has seen ulceration of the aortic valves in all of his eight cases of septic endocarditis. Laupre[7] found the aortic valves especially attacked and the mitral seldom. Lowenhardt[8] found the ratio of mitral to aortic as 1 to 3. In Cotton's[9] series of fifty-five cases, thirty-three had aortic lesions alone and fourteen had aortic regurgitation, as

well as mitral stenosis. The predilection of syphilis for the aortic valves is so well known that I need not dilate upon it here. Libman, in his extensive writings upon the subject, has given no definite statement as to the number of instances in which he found syphilitic valves subsequently bacteria-infected. Apparently the first definite case was reported by Leroy H. Briggs[10] in 1922. Subsequently Gallavardin and Gravier[11] in 1927 reported that an extensive search through the literature had revealed no case other than that of Briggs.[10] Gallavardin and Gravier[11] reported a case observed by them in 1919, and at the same meeting of the Société Médicale d' Hôpital de Lyon, Cade[12] reported another case seen by him in 1926. Pineles[3] in 1926 reported four cases, only one of them with autopsy. He remarks that the combination had been reported by Kastner,[13] Curschmann,[5] and by Briggs.[10] My own search through the *Quarterly Cumulative Index Medicus* back to the time of its inception in 1916 has revealed no other cases. The rarity of the combination of bacterial endocarditis with syphilis has been variously explained. Briggs[10] believes that the infectious grafts are produced by an embolic mechanism, and that the old rheumatic lesions, being better vascularized, are more easily infected than the syphilitic ones. Gallavardin and Gravier[11] dispute such a theory as based upon debatable postulates. They believe that the inoculation is direct from the heart blood; the syphilitic lesions remaining remarkably smooth and presenting their endothelial linings offer small opportunity for infection, whereas the rheumatic lesions, scarred by many ulcerations, favor bacterial inoculations. I now add to the previous small collection the following observation:

CASE I.—I. L. (No. 2798), aged thirty-six, was admitted to Touro Infirmary on June 25, 1925, because of paralysis of the left side, loss of weight, and pain in the abdomen. In June, 1924, at the time that he was under treatment for a burn on the left foot, he was found to have a positive Wassermann. At that time he was given a dose of salvarsan. He took no more because of a sore arm following the injection. After this he was apparently well until April, 1925, when he began to have griping pains in the abdomen, just below the umbilicus. The pains were not severe, occurred irregularly and had no relation to meals. After a few weeks he began to have pains in the legs and arms. He was then given an injection of salvarsan, following which he was nauseated and vomited. He had a similar experience after another injection of salvarsan ten days later. He first came to our out-patient clinic on May 19. The Wassermann was then 4+ positive, and he received two intramuscular injections of bismuth salicylate. On June 3 his left foot became swollen and red and very painful along the instep.

It was practically well by June 12. He lost 32 pounds in three weeks. On June 16 he began to have diplopia. On June 22, while taking a bath, his left foot gave way under him and he fell. He found also that the left arm was helpless. He did not lose consciousness. The stroke was not preceded by any numbness. The next day his family noticed that he could not talk well and his mouth was drawn over to one side. In 1906 he had had a sore on the penis. He had gonorrhea several times. Otherwise his previous history is of no interest. The physical examination upon admission showed a fairly well-nourished, well-oriented man. His speech was slightly indistinct. The pupils were equal, regular, and reacted normally to light. There was evidence of paresis of the muscles of the face on the left side. Both the left upper and lower extremities showed great weakness. He was able to flex the left forearm and to flex the fingers, but only with considerable weakness. There was difficulty in raising the left leg. All the tendon reflexes of the left upper and lower extremities were exaggerated. Examination of the heart revealed a systolic murmur at the apex and a diastolic murmur at the base and all along the left border of the sternum. The radial pulse was Corrigan in type. There was a capillary pulse on the forehead. Pistol-shot phenomena over the femorals. Because of his apparent intolerance for salvarsan, he was given intramuscular injections of mercury salicylate, up to July 24, by which time thirteen injections had been given. Then 0.3 gms. of neosalvarsan was given intravenously. The patient's temperature for the first two weeks had ranged between normal and 101°, but this had been followed by a period of normal temperature during two weeks. Just before he had his injection of neosalvarsan he had had two irregular rises of temperature, and from this time on throughout to the time of his death his temperature chart shows an irregular course, for the most part ranging between normal and 102°, but at times showing periods of a week at a time when the temperature was approximately normal. At other times there were sudden rises to about 102° and 103° and even higher. On August 2 the blood-pressure was noted at 108/20 right arm, 120/20 left arm. The liver was found enlarged 3 fingers' breadth below the costal margin, and the spleen edge was also felt 3 fingers' breadth below the costal margin. On August 28 the joint of the left little finger was slightly red and sore. On September 7, there was a small pea-size swelling under the left arm. On October 7, a painful red spot on the left middle finger. On October 23, a painful spot on the dorsum of the right hand. On October 24, a painful tender spot on the sole of the right foot. On October 29, pain in the hypogastrium extending to the left flank. On October 30, pain in the left side of the abdomen. The impression was that there had been an embolus into the spleen. On December 22 a note was made that the patient had exhibited a steadily increasing pallor, there was flatness with very distant, almost absent, respiratory sounds on the left side of the chest. Crepitant and subcrepitant râles at the base of the right lung. On December 23 the patient was entirely unconscious. The left arm, while rigid always hitherto, fell when lifted, whereas the right arm was controlled by the patient. The next morning the patient was conscious and moved his head slightly. From this time on he was somnolent. On December 31 he developed what appeared to be edema of the lungs. On January 1 he was in profound coma, with labored respiration and tracheal râles. The heart grew gradually slower to about 50, when it ceased. The heart stopped thirty or forty seconds before the respiration. The blood showed a

strong positive Wassermann throughout. Repeated blood cultures yielded invariably pneumococci, ranging from 30 to as many as 430 colonies per 100 cubic centimeters of blood. The spinal fluid showed a cell count of 290, globulin 3+, Wassermann 2+, colloidal gold 0001234454. The autopsy showed a considerable amount of straw-colored fluid in the abdomen. The spleen showed several large infarcted areas. The liver was enlarged. The kidneys showed acute and chronic nephritis, and infarction by infected thrombi producing abscess formation (microscopic) at the side of the infarction. There was a moderate amount of straw-colored fluid in both pleural cavities. The lungs showed an acute congestion, and microscopically a lobular pneumonia. There was considerable straw-colored fluid in the pericardial sac. The heart was greatly enlarged, flabby and friable. The valves on the left side presented large cauliflower-like growths. The brain showed an area of softening in the region of the internal capsule on the right.

I wish to report here a second case of pneumococcal endocarditis in a syphilitic, but where the previous valve damage was not syphilitic.

CASE II.—F. S. (No. 2523), white male, laborer, aged twenty-two, was admitted to Touro Infirmary at 11:30 P.M. on November 17, 1924. He was vomiting and apparently in a state of shock. The surface was cold, the pulse thready, about 110 per minute, respirations 40. He was well-oriented, but very restless. He complained of pain in the epigastrium and the right hypochondrium, which was made worse by coughing. There were numerous crepitant râles over the right side of the chest anteriorly and in the right interscapular space. The abdomen was markedly rigid on the right side, especially the upper right half. This phenomenon was so marked that, taken in connection with the vomiting and the state of shock, it seemed to point to some intra-abdominal condition. In view, however, of the râles in the right lung, it was thought that probably the abdominal rigidity might be due to pain referred from the thorax. The patient was given morphine and atropine hypodermatically and a rectal drip of warm saline solution and black coffee. The next morning at 10 o'clock the patient was alert, bright and no longer in distress. The surface was hot. The respirations were almost entirely thoracic, the abdomen being held rigid. The face was cyanosed. The alae nasi moved with the respiration. There was marked cyanosis of the finger nails and marked clubbing of the fingers. The right lung now was dull anteriorly from the apex down. The dulness merged into the liver dulness below into the cardiac dulness on the left. This dulness extended out into the right axilla. Posteriorly it reached from the apex to the fourth or fifth dorsal spine. Over this area of dulness bronchial breathing was heard. Crepitant râles were heard below the angle of the scapula. The left lung was slightly hyperresonant and exhibited vesicular breathing. The heart was enlarged to the left. The left limit of dulness was beyond the left nipple in the fifth intercostal space 9 centimeters from the mid-line. There were diffuse multiple pulsations in the fourth and fifth intercostal space from the midclavicular to the nipple line. A systolic murmur was heard only in the region of the apex beat. The first sound was very forcible everywhere. The pulmonic second sound was markedly accentuated. The heart was rapid, 128, but regular. The blood-

pressure was 110 systolic, 60 diastolic. The radial arteries were distinctly thickened. The abdomen was still markedly rigid on the right side, especially in the right upper quadrant. The right hypochondrium was flat on percussion and the right side of the abdomen below the umbilicus was dull, the left side of the abdomen being tympanitic. Pressure in the right hypochondrium caused pain. The patient was well-nourished. The skin, except for a slight acne of the face, was normal. There was no edema. The sclerae were slightly icteric, the lips slightly cyanotic. The inguinal glands were moderately enlarged, otherwise there was no adenopathy. The pupils were large, but did not react to light. The knee-jerks and plantar reflexes were normal. The diagnoses arrived at on the basis of this examination were lobar pneumonia and chronic valvular disease (mitral) of the heart.

The patient gave the following account of his previous illness. Six weeks before his present admission he had had a chill and pain in the left lumbar region. He was not sure that he had fever, but thought that he had because he was very restless at night. Within a week's time he had two more chills, again with pains in the left lumbar region. He was then admitted to another institution where he was treated for pyelitis. During his stay there he had several more chills and fever. On November 5 he deserted from this other hospital. On November 9 he again had fever which caused him to go back to bed, and on November 11 he had another hard chill lasting an hour. Evidently he had fever which continued all of this time up to the admission here on November 17. On November 16, the day before his admission, while he was eating ice cream he had a coughing spell, with a sensation of strangulation. This was followed by a chilly sensation associated with an indigestion-like pain up and down the sternum. The pain radiated to the right shoulder blade, for the most part cramp-like and localized in the epigastric region. He thought he expectorated blood, but of this he was not sure.

His previous history was as follows: He had measles, and whooping cough as a child, typhoid fever at the age of seven years, being sick for eleven weeks at this time. A year later, 1911, he was sick for a week with cold and fever, and at this time the doctor said he had a bad heart. He had growing pains as a boy of about eleven or twelve years, but was never laid up with rheumatism or inflammation of the joints. The tonsils were removed about six years ago; he had some deafness prior to and following the tonsillectomy. Eight years before his admission he had had a chancre, and on account of this he had been circumcised. Later he had three injections of salvarsan and twelve mercury rubs.

From the time of his admission on November 17 to his death on January 12, 1925, he exhibited an irregular temperature, ranging from normal to usually between 101° and 102°, and on several occasions rising to as high as 104°. From time to time he had severe chills. The dulness and râles in the right lung had disappeared by November 23. There was never at any time any cough nor expectoration. The rigidity of the abdomen lasted also but a few days. On November 29 the patient had pain in the left flank which seemed to first radiate upward from the scrotum to the left groin. The patient declared this attack similar to those he had previous to his admission to Touro. The urine showed red blood-cells. On December 11 there was a sensitive area just behind the angle of the jaw on the right side. On December 19 the spleen was felt 2 fingers' breadth below the costal margin. The patient coughed and expectorated

bloody sputum. On December 23 the pain in the abdomen radiated upward to the left flank. The urine showed no red blood-cells, but a few granular casts and a few pus cells. On December 27, pain in the distal end of the right little toe; slight discoloration of the second, third, and fifth toes. On December 30, pain in the right ear, localized tenderness at the posterior angle of the jaw. On December 31, chill with irregular heart action, dulness in the left lung with crepitant râles. Several hours later paralysis of the left arm and left leg, left knee-jerk exaggerated, marked left ankle clonus. The patient was greatly excited but perfectly lucid. On January 1, somnolent but easily roused, complete paralysis of the left arm and left leg, the forehead wrinkled equally on both sides, the right eye closed more tightly than the left, the naso-labial fold more marked on the right than on the left, the right angle of the mouth drawn up while the left was immobile. When the tongue was protruded it was drawn markedly to the left. Bloody urine. On January 2, rapid labored breathing; a few crepitant râles in the third right interspace just above the right nipple; friction rub just below the right nipple. On January 5, abdomen somewhat fuller than usual; flatness in the left flank when the patient was tilted to that side. Respirations deep and pumping, the auxiliary muscles being brought into play. The systolic heart murmur continued throughout, growing louder. The heart was rapid and there was often a note made of gallop rhythm. Repeated blood cultures showed pneumococci type 4; the first culture was made on November 18 and the last on January 8. A culture made forty-eight hours after the intravenous administration of mercurochrome showed pneumococci, 50 colonies per cubic centimeter of blood, and one day later there were 70 colonies per cubic centimeter. The Wassermann reaction on November 18 and November 24 was weakly positive, but on December 12 was strongly positive. The blood was affected as is usual in cases of infectious endocarditis. The red blood count on admission was 4,240,000, hemoglobin 70 per cent. This fell later to 3,000,000, hemoglobin 45 per cent. There was a leukocytosis throughout, the count being 25,000. Later it was usually from 11,000 to 15,000. On January 4 the leukocyte count was 38,000. The autopsy was performed by Dr. J. A. Lanford.

His report is as follows: Male adult about thirty-five to forty years of age. Body length five feet eleven inches. The development powerful, the general nutrition poor. The muscles were well developed but there was a lack of subcutaneous fat. The skin was loose, pliable and elastic. Scattered over certain areas were small petechial spots, especially over the chest and forearms. Tattoo marks were found on both forearms. There was no edema nor jaundice present. In the precardial area there was a slight bulging; also a slight bulging at the costal margin on the left side. The abdomen was scaphoid in shape. There was a scar on the ventral surface of the penis just behind the corona which measured about 1½ centimeters in diameter, possibly the result of circumcision. There was a general adenopathy. There were five to eight glands on the inguinal region of small buckshot size.

The abdominal wall showed a slight amount of subcutaneous fat. The muscles were well developed and red in color. The peritoneum was smooth and glistening. There was a small amount of straw-colored fluid in the abdominal cavity. The liver extended 6 centimeters below the costal margin in the left midclavicular line, 14 centimeters below the sternum in the midsternal line, 6 centimeters below the costal margin in the right midclavicular line and 4 centi-

meters below the costal margin in the midaxillary line. The other organs were in their normal relation. The diaphragm extended to the fifth rib on the right and the fifth rib interspace on the left.

Pleural Cavities.—There were no adhesions. The lungs were lying in their normal relations and were normal.

Pericardial Cavity.—There were 400-500 cubic centimeters of fluid.

Heart.—Enlarged, especially the left ventricle. Heart measured 19 centimeters from the mid-line to the apex and 7 centimeters from the right side to the mid-line. The longest diameter of the heart measured 20 centimeters. There were vegetations on the mitral valve extending up into the auricle. *The other valves were free from vegetation.* No thrombosis in the auricular appendages. The attached portion of the aorta showed arterial plaques. The mitral valve measured 14 centimeters, the aortic valve 7 centimeters, the pulmonary, 7 centimeters, and the tricuspid, 15½ centimeters, in width. The left ventricle measured 2 centimeters in thickness. The right ventricle, 5 centimeters. *Cultures from the blood removed from the heart showed pneumococci.*

Spleen.—The spleen measured 17 by 19 by 5 centimeters, and showed in the center a large infarct measuring about 3 centimeters in width and extending the width and breadth of the spleen. There were also a number of smaller infarcts scattered through the spleen.

Liver.—The liver was somewhat enlarged, dark reddish-brown in color, and somewhat mottled in appearance. Here and there were found a number of areas lighter in color which were relatively regular in outline and suggested infarct formation. There was one very large one just to the right of the suspensory ligaments involving an area roughly 4 centimeters square. The cut surface showed rather a nutmeg appearance and there were apparently infarcted areas which were considerably lighter than the surrounding tissue.

Kidneys.—Both kidneys were enlarged. The left measured 16 by 7 by 4 centimeters. The capsule peeled off easily. The outer surface showed numerous small purplish-colored spots measuring about 2 centimeters in diameter (a healed infarct), light pink in color and easily differentiated from the medulla. Scattered over the substances of the kidney were other old and recent infarcts. The right kidney presented a similar picture to the left.

Adrenals.—Adrenals presented no gross pathology.

Intestines.—The intestines showed here and there small amount of injection and evidence of infarction.

Mesenteric Lymph-nodes.—Enlarged.

Brain.—Upon opening the skull and removing the calvaria the dura was found attached to the brain in the area of the precuneus. No gross pathology on the external surface of the brain. Upon sectioning the brain, however, there was found a diffuse hemorrhage into the right internal capsule.

Anatomical Diagnosis.—Acute and chronic endocarditis (mitral). Septic infarct of the brain (right internal capsule). Old and recent infarction of the spleen. Old and recent infarction of the liver. Old and recent infarction of the kidneys. Infarction of the intestines. Mesenteric adenopathy. Cicatrices and fibrous adhesions of the dura mater.

Microscopic Diagnosis.—Spleen: Infarction. Congestion. Miliary abscesses.

Lymph-nodes.—Congestion and suppurative changes.

Liver.—Pigmentation. Congestion. Albuminous and fatty degeneration. Septic thrombosis. Miliary abscesses.

Kidney.—Septic infarction. Miliary abscesses. Albuminous fatty and hydropic degeneration. Chronic interstitial nephritis. Congestion. Glomerular degeneration.

Lung.—Mixed pneumonia. Old pleurisy.

Adrenals.—Albuminous and hydropic degeneration.

The contrast between these two cases brings into relief a number of points important and instructive. In Case I we were dealing with a patient who not only had a strongly positive Wassermann before the development of his bacterial endocarditis, but had had a hemiplegia which at his age could in all probability be attributed to a cerebral syphilis. He had also, which is more important, at the very time that he came for treatment for his hemiplegia and before his bacterial endocarditis was manifest, a typical aortic regurgitation, and we are probably justified in assuming that this aortic regurgitation had been produced by the syphilitic process. Upon this syphilitic aortitis and aortic regurgitation was then superimposed his bacterial endocarditis. In the second case the course of events was quite different. The patient had had, when a boy, growing pains. When he was nine years old a doctor had discovered the heart damage. It was only subsequent to this, namely, when he was fourteen, that he had a chancre. We must assume, therefore, that a young boy with an already damaged mitral valve acquired syphilis. The clinical and postmortem evidence supported the view that syphilis played no rôle in the heart damage. It will be observed that this patient's Wassermann was negative at the time of his admission, became subsequently slightly positive and then strongly positive. This does not justify us in attributing any causal relationship of syphilis to the process which caused his death. Landau and Held[14] reported that they had found the Wassermann positive in ten out of thirty cases of endocarditis lenta. Of these ten patients six came to autopsy. In four of them there was no evidence of syphilis either during life or at the postmortem. One of them had an Argyll-Robertson pupil, but at autopsy showed no evidence of a specific lesion of the aorta. Another one had an insufficiency of the aortic as well as of the mitral valve, a hemorrhagic glomerulo-nephritis, infarct of the spleen and kidneys, embolism of the left sylvian artery with right hemiplegia and tabes dorsalis, all of which were con-

firmed at autopsy. Of the four patients not autopsied two had no clinical signs of syphilis, one had no clinical signs but did have a positive Wassermann in the spinal fluid, and one had irregular Argyll-Robertson pupils. Of the ten patients, therefore, with positive Wassermanns, there were only four who presented either during life or at autopsy anything that could be interpreted as evidence of damage by syphilis anywhere in the body. Only one of them presented at autopsy any evidence of syphilitic disease of the aorta. Palmer[15] reported a case of acute pneumococcus endocarditis in the course of lobar pneumonia, the patient a negress who had had a sore on the vulva and gave a history of miscarriage, gave a positive Wassermann of 4+. Palmer,[15] however, says that he had "no evidence that there was an old syphilitic endocarditis present," and remarked that this was a possibility but not a very great one. No autopsy.

In interpreting positive Wassermanns occurring in the course of endocarditis lenta, we are confronted, as Landau and Held[14] have pointed out, with three alternatives:

1. We are dealing with syphilis localized in different internal organs (aorta, spleen, kidneys, etc.) capable in exceptional cases of giving the picture of endocarditis lenta.

2. A previously existing syphilitic lesion of the aorta and its valves has proved a locus minoris resistentiae, which may be easily invaded by the streptococcus viridans, pneumococcus, etc.; a combined disease, therefore.

3. The positive Wassermann has no specific significance. It would be only an accidental result of the disturbance of the lipoids, colloids, in the serum. Such a non-specific positive Wassermann does occur in other diseases.

It seems to me that in our Case I we are dealing with the second of these alternatives, namely, an engrafting of a bacterial endocarditis upon a valve previously damaged by syphilis. In Case II we have an example of either the first or the third alternatives, probably the third.

We may now turn our attention from the rôle of the syphilitic to that of the pneumococcal infection in our cases. The pneumococcus is not a frequent cause of subacute endocarditis. Blumer[2] found it in sixteen cases (5 per cent.) in his collection of 304 cases. Thayer[16] found in 206 cases of bacterial endocarditis twenty-eight (13 per

cent.) due to pneumococcus. Practically all of the reports of pneumococcus endocarditis in the literature relate to an acute endocarditis, occurring in the course of, or immediately following, a pneumonia. James,[17] in 1898, reported two fatal cases of pneumococcal endocarditis neither of whom had had any pulmonary involvement. Laubry and Coffin[18] reported a "primary pneumococcal endocarditis ending in cure." Locke[19] remarks that "it seems probable that true pneumococcal endocarditis is a considerably rarer complication of pneumonia than is usually supposed." Norris and Farley[20] found endocarditis in 6 per cent. of their pneumonia cases coming to autopsy. In Locke's[19] series of 835 fatal pneumonias, thirty (3.6 per cent.) showed acute endocarditic lesions and in only fourteen of these thirty were pneumococci recovered from the vegetations; this means an incidence of 1.6 per cent. Preble,[21] in 1904, had collected from the literature 11,243 cases of pneumonia, 126 of whom had endocarditis as a complication (1.1 per cent.). Locke[19] calls attention to the fact that in many of these cases of Preble's and in subsequently reported cases the data given are quite insufficient to prove that the endocarditis was due to the pneumococcus. The final test, he insists, should always be the actual demonstration of pneumococci in the valvular lesions. Even the demonstration of the pneumococcus in the blood-stream in the case of pneumonia does not necessarily prove that an existing acute endocarditis is due to the pneumococcus, though, of course, it is strong presumptive evidence. Merklen and Wolf[22] reported a pneumococcal septicemia with acute endocarditis grafted on a healed and silent endocarditis. This followed a bronchial pneumonia. In our Case I there was no history of the patient's having had a recent pneumonia and at no time while he was under observation did he present any evidence justifying such a diagnosis. At autopsy there was no gross evidence of pneumonia, and it is only in the histological studies that mention is made of lobular pneumonia. I think we must insist in this case that we are dealing with a pneumococcal septicemia without localization in the lungs. In the second patient there was at the time of his admission evidence of a pneumonia. It was certain, however, that his bacterial endocarditis had preceded this pneumonia and that the latter was merely a local manifestation of the generalized infection with the pneumococcus.

These two cases of subacute bacterial endocarditis have been presented because they illustrate in striking fashion additional difficulties in the diagnosis of this protean disease. This form of endocarditis is probably more frequent than is indicated by the statistics. Several German authors have commented upon the fact that it seems to have grown more frequent since the Great War. This increase in frequency may, however, be more apparent than real, for it may be due to better diagnosis. It is only in the last ten to fifteen years that blood culturing has become a common everyday procedure. As you know, endocarditis lenta has been mistaken for a great variety of diseases: malaria, typhoid, tuberculosis, syphilis, purpura, hidden focus of infection, pyemia, renal stone, urinary tract tuberculosis, splenic anemia, occult malignancy, pernicious anemia, and a veritable host of other conditions. The great sign of the preëxisting chronic valvular disease which should put us on our guard and lead to the proper diagnosis is often missed. The condition of shock presented by our second patient on admission and the localizing signs in the right side of the abdomen gave strong reason for suspecting an acute abdominal condition, as, for example, a ruptured gall-bladder, a ruptured appendix, or a perforated duodenal ulcer. Only the presence of the signs of pneumonia in the right lung and the explanation of the abdominal signs on the basis of pain referred from the chest saved him from an operation at that time. The fact that he had chronic valvular disease of the heart might very well have been interpreted as having no relation to his pneumonia nor to his presumptive abdominal condition. The history of syphilis and the later positive Wassermann reaction might have served as a basis for believing that there was an active syphilitic process going on in the heart or elsewhere. The signs in the lungs and the positive blood culture naturally led to the diagnosis of pneumonia in a patient with a preëxisting chronic valvular disease of the heart and syphilis. As I have already suggested, it would have been logical to have assumed that the sequence of events had been chronic valvular disease of the heart, pneumonia, pneumococcocemia, subacute bacterial endocarditis, but this assumption had to be abandoned in the light of the history that he had been in the previous weeks treated in another institution for what was thought to be some disease of the left urinary tract, but which was probably an embolus of the left kidney. It is

probable, therefore, that he was already suffering from the subacute bacterial endocarditis before the development of the pneumonia. We may not assume that there was an embolus to the lungs as the postmortem showed the vegetation on the mitral valve only, and none on the tricuspid and pulmonary valves. The hemiplegia might have been attributed to syphilis but there was every evidence that it was due to an embolus from the valves. In Patient I we had the impression that the hemiplegia had occurred prior to the onset of the bacterial endocarditis and that it was due to the syphilitic process. It must be confessed, however, that the establishment of fever followed soon after the hemiplegia if it did not precede it.

In summary, therefore, we may make from these two cases the following observations:

1. Old rheumatic heart lesions present a more favorable basis for the development of endocarditis lenta than do syphilitic lesions.

2. Endocarditis lenta may occur in patients who have an old rheumatic heart disease and syphilis as well, and that the latter may play no important rôle in the cause of death.

3. Endocarditis lenta may be in exceptional cases grafted upon old preëxisting syphilitic lesions, and thus the syphilis may play an important rôle. Even where this is the case, however, anti-syphilitic treatment does not afford the promising prognosis that it usually does in other syphilitic conditions.

4. The occurrence of even a strong positive Wassermann reaction in the course of an endocarditis lenta is by no means presumptive evidence that the patient is also syphilitic.

5. The pneumococcus, while not a frequent cause of endocarditis lenta, is an important one. Most of the cases of pneumococcal endocarditis are acute, occurring in the course of pneumonia or subsequent to it.

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SUBPHRENIC ABSCESS: ITS DIAGNOSIS AND TREATMENT, WITH SPECIAL REFERENCE TO THE EXTRAPERITONEAL OPERATION*

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THE diagnosis and treatment of subphrenic infections still re-
mains a great surgical problem. An infection in the subphrenic
space represents one of the gravest complications following a sup-
purative process within the peritoneal cavity, partly because of the
high mortality attended with surgical treatment of the condition.
It is stated by most authors writing on the subject that the mortality
rate varies from 50 to 100 per cent. In the most recently published
textbook on surgery (Stewart and Lee) it is stated that the mor-
tality rate in untreated cases of subphrenic abscess is almost 100 per
cent., whereas in those in which operation is performed, the mor-
tality rate is from 50 to 100 per cent.

A careful analysis of subphrenic infections reveals the fact that
the high mortality rate associated with this condition is due to
(1) delayed diagnosis resulting in the development of a marked
toxemia which obviously decreases a patient's chance of recovery,
and (2) to contamination of one of the large serous cavities by drain-
ing the abscess through either the pleural or an uninvolved portion
of the peritoneal cavity. An attempt is made in this presentation to
demonstrate how these two factors, which are responsible for the high
mortality rate in infections in the subphrenic space, may be obviated.

Anatomy of the Subphrenic Space.—In considering infections of
the subphrenic space it is important to determine which one of the
various areas in the upper portion of the abdomen is involved by
the inflammatory process. From a surgical standpoint it is desirable
to consider the subphrenic space as that area located between the
diaphragm above and the transverse mesocolon and transverse colon
below. This space is in turn divided into a suprahepatic and an

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infrahepatic portion by the liver. The suprahepatic space, which is located between the diaphragm above and the liver below, is subdivided into one extraperitoneal and several intraperitoneal spaces. The extraperitoneal space is located within the confines of coronary ligament which is the reflection of the peritoneum from the under surface of the diaphragm on to the superior surface of the liver. This space corresponds to that portion of the superior surface of the liver which is not covered by peritoneum. The intraperitoneal portion of the suprahepatic area is divided into a right and a left space by the falciform or suspensory ligament, the lower free edge of which is continued down to the umbilicus as a round ligament. On the left side the left prolongation of the coronary ligament, the left lateral ligament, passes backward to lie at the posterior edge of the left lateral lobe of the liver. The right prolongation of the coronary ligament, the right lateral ligament, however, passes somewhat anteriorly, subdividing the right superior space into a larger anterior and a smaller posterior space. The infrahepatic space, which is located between the liver above and the transverse colon below, is divided into one right and two left inferior spaces by the round ligament and the ligament of the ductus venosus. The "left inferior space" is again divided by the gastrohepatic omentum into an anterior and a posterior space, that area located posterior to the lesser omentum being the lesser peritoneal cavity and that lying anterior to it being the "left anterior inferior space," which is a part of the greater peritoneal cavity. It will be seen from this description that on the superior surface of the liver are three intraperitoneal spaces, an "anterior and a posterior right superior space," and a "left superior space," and beneath the liver there are three spaces, an "anterior and a posterior left inferior space" and a "right inferior space."

The "right posterior superior space" is the most frequent site for an inflammatory process in the subphrenic area. In a series of seventy-eight cases of subphrenic abscess in the London Hospital, reported by Fifield and Love, the "right posterior superior space" was involved in twenty instances, an incidence of 31.7 per cent. An abscess in the "right posterior superior space" is frequently complicated by a similar suppurative process beneath the liver in the "right inferior space." The extraperitoneal space which is on the

superior surface of the liver surrounded by the coronary ligament was the site of abscess in twenty of Fifield and Love's seventy-eight cases (25.6 per cent.).

Etiology.—The etiology of subphrenic abscess is varied, but the condition usually follows a suppurative process within the peritoneal cavity. Primary idiopathic subphrenic infection may occur, however, as evidenced by eight cases reported by Schwartz, in all of which infection of the subphrenic space was evidently hematogenous and followed a grippal infection. The origin of the infection in Fifield and Love's eighty-four cases of subphrenic abscess and in the

CHART I

Origin of Subphrenic Abscess in Fifield and
Love's Series of Cases

	No. of cases	Per cent of all cases
Appendicitis..............................	30	35.7
Perforated duodenal ulcer..................	12	14.2
Perforated gastric ulcer...................	12	14.2
Operations on stomach.....................	9	10.7
Gall-bladder..............................	5	5.9
Kidney..................................	2	2.3
Chronic gastric ulcer.....................	1	1.1
Carcinoma of the stomach.................	1	1.1
Carcinoma of the esophagus...............	1	1.1
Fractured pelvis..........................	1	1.1
Rib.....................................	1	1.1
Unknown................................	9	10.7

496 cases collected by Perry is shown in Charts I and II, respectively. According to Whipple, in a review of 1,000 cases, the original infection was as follows: in the stomach in 25 per cent., in the appendix in 21 per cent., in the biliary tract in 16 per cent., and in duodenum in 5 per cent. of the cases. From these statistics it is evident that the most frequent causes of subphrenic infections are suppurative processes beginning in the appendix, stomach, duodenum, and biliary passages. The incidence of subphrenic infection following acute appendicitis varies considerably according to different authors (from .34 per cent. to 6.1 per cent. of all cases and from 6.6 per cent. to 92.8 per cent. of all residual intra-abdominal abscesses, Chart III).

Not all cases of subphrenic infection progress to suppuration. In fact, in the author's experience the majority of these resolve

CHART II

Origin of Infection in 496 Cases of Subphrenic Abscess
Collected from the Literature by Perry

Original lesion	Per cent of all cases of subphrenic abscess
Appendix..	25.3
Stomach...	23.1
Duodenum..	3.2
Liver and bile passages............................	8.8
Hydatid cysts......................................	5
Intestine..	2.4
Pancreas...	1
Spleen...	2
Kidney...	4.6
Ribs...	1.3
Intrathoracic lesions..............................	4.9
Female genital organs..............................	1.3
Traumatic lesions..................................	3.4
Metastatic...	4.4
Unknown and various causes.........................	5.5

spontaneously and relatively few, certainly less than half, of them suppurate. Neuhof, in a series of 972 cases of appendicitis, re-

CHART III

Incidence of Subphrenic Abscess Following Acute Appendicitis
As Determined by Cases Collected from the Literature

Author	Cases acute appendicitis	No. residual abdominal abscesses	No. subphrenic abscesses	Per cent acute appendicitis	Per cent residual abdominal abscesses
Stillman..............	545	24	9	1.65	37
Bancroft..............	584	27	2	.34	7.4
Cutler................	974		6	.61	
Beekman..............	145	15	1	.7	6.6
Clairmont and Meyer..	1,179	79	7	.5	8.8
Suermondt............	630	42	39	6.1	92.8

ported fifteen cases of subphrenic infection which did not progress to suppuration. Similar cases have been reported by Lee, Clenden-

ing, and the author. Infection may gain entrance to the subphrenic space in a number of different ways. Organisms may extend directly to the various intraperitoneal spaces from the appendix along the paracolic groove on either side of the ascending colon or from the stomach, duodenum and biliary tract. They may be carried through the retroperitoneal lymphatics to the subphrenic region, especially the extraperitoneal space. As a result of a phlegmon extending upward, the extraperitoneal subphrenic space may become involved. A portal thrombophlebitis with the development of liver abscess and subsequent rupture into the subphrenic space may also produce infection in the subphrenic area.

Symptoms and Signs.—The symptoms and signs in subphrenic infection are varied. There are relatively few symptoms which are pathognomonic of the condition, but there are certain early manifestations which should make one suspect an infection in the subphrenic space. In any individual who has recently had a suppurative process within the abdomen and who continues to have constitutional signs of infection, the possibility of a subphrenic infection must be considered. In addition to the constitutional signs of infection, the patients, especially those with suprahepatic infections, may complain of pain in the thorax which at times is referred to the supraclavicular region (such a case has been reported by Christopher), the upper portion of the abdomen, and the flank. In those cases in which the "right posterior superior space" (the most frequent site) is involved the patients usually complain of a pain or soreness in the right flank. On physical examination localized tenderness over the involved area is usually present. This may be difficult to elicit, however, because of the protection of the subphrenic region by the overhanging thoracic cage. In cases in which the "right posterior superior space" is involved the tenderness is limited to and localized over the right twelfth rib. In the infrahepatic infections the tenderness is usually along the costal margin either on the right or left side, depending upon the location of the lesion. Most authorities place too much importance on pulmonary symptoms and signs, which occur only in those cases in which the inflammatory process has existed a relatively long period of time. Clute states, "It is almost always true that a simple serous fluid will be present in the chest when there is pus just beneath the diaphragm." Bauman found an

associated pleural exudate in 20 per cent. of his cases. In six cases reported by Dexter a diagnosis of pleurisy was made before the true subphrenic lesion was suspected. He remarks, "Obviously it is highly desirable to drain the abscess before the structures above the diaphragm are involved. In reviewing the subject as well as the cases which have come under my own observation, it is striking to know how seldom a diagnosis is made early enough to accomplish this." In a series of twenty-four cases of subphrenic abscess reported by Beye a transphrenic infection occurred in eight. The high percentage of pleural complications occurring in the reported cases undoubtedly represents a delayed diagnosis. An infection extending from the pleural cavity into the peritoneal cavity is extremely rare as emphasized by Beye, who found in a series of 190 cases of acute and chronic empyema that infections passed through the diaphragm into the peritoneal cavity in only one instance, and in this instance the diaphragm was traumatized during the operation. Archibald in a series of 500 cases of subphrenic abscess collected from the literature found only seventeen in which the infection had extended downward from the pleural cavity.

Of paramount importance as regards diagnosis are the roentgenologic findings. Early in the condition these findings may consist of limitation in the movement of the diaphragm on the affected side associated with some elevation. Elevation of the diaphragm is especially emphasized by LeWald, Pancoast, Granger, and O'Brien. Pancoast and Granger emphasize the fact that even though roentgenologic findings are of utmost importance as regards diagnosis in subphrenic infections, it is important and essential to correlate these findings with the clinical data in order that the correct diagnosis might be made. The roentgenogram should be made with the patient in the upright position and according to Granger preferably at 6 feet. Granger prefers two plates, a posterior anterior view and a lateral one. Granger, from his extensive experience with subphrenic lesions, is able to differentiate between subphrenic abscesses which result from perforation of liver abscesses and those in which the infection occurs as a result of a suppurative process within the peritoneal cavity. In the subdiaphragmatic abscess following liver abscess, according to Granger, in the posterior anterior roentgenogram there is, in addition to elevation of the diaphragm character-

istically an obliteration of the cardiophrenic angle; and in the lateral view, an obliteration of the costrophrenic angle. In contrast to these findings a posterior anterior roentgenogram of a patient with a subdiaphragmatic abscess following an intraperitoneal infection such as peritonitis, shows obliteration of the costrophrenic instead of the cardiophrenic angle, and in the lateral view the posterior instead of the anterior costrophrenic angle is obliterated. This differentiation is probably due to the fact that in those cases of subphrenic abscess which are secondary to an infection within the peritoneal cavity the infection is usually located in the "right posterior superior space." Relatively rarely gas is contained in the subphrenic abscess cavity. A roentgenogram of such a case is characteristic in that a clear zone is visible beneath the diaphragm and above the liver shadow. Even though according to most individuals this finding is usually present in subphrenic abscess, it is an infrequent or late sign, and no dependence should be placed upon it when it is not found. The importance of fluoroscopy in suspected subphrenic infection cannot be overemphasized in order to detect early alteration in the movement of the diaphragm.

There is considerable controversy concerning the advisability of exploratory aspiration of the subphrenic area in suspected cases of subphrenic infection. Ullman and Levy advocate an exploratory aspiration. Allen and Douglas believe that exploration is justified in the doubtful cases. Aspiration is condemned by Lockwood, Hodges, Grove, and Russell. The author feels that aspiration is never justifiable except to determine the character of an exudate within the pleural cavity, which may be associated with or complicate the subphrenic infection. No attempt should be made to aspirate a suspected abscess beneath the diaphragm unless all is in readiness for operative interference, and then every precaution should be taken to avoid entering or penetrating the pleural and peritoneal cavities. In order to do this it is advisable to insert the aspirating needle, which is attached to a dry syringe, in the posterior axillary line at the level of the spinous process of the first lumbar vertebra. The needle is directed upward and backward at an angle of 45 degrees. Aspiration should be performed during the introduction of the needle so that there will be no danger of passing through an abscess without recognizing it. Under no other circumstances

should an exploratory aspiration be done. The limitations of aspirations are well exemplified by a case reported by Hirsch in which twenty-three exploratory aspirations were done without any results. On the twenty-fourth aspiration pus was obtained. That diagnoses in cases of subphrenic abscesses are frequently and, in fact, usually made relatively late in the condition is demonstrated by a case reported by Cottle. The patient had an appendectomy and excision of a gastric ulcer, following which he developed symptoms and signs of a right-sided pleural lesion. Roentgenograms showed, however, a high diaphragm on the affected side. The diagnosis was disputed for three and a half months, and it was not until four months after the original operation that a diagnosis of subphrenic abscess was made. The abscess was successfully drained with complete cure of the patient.

The mortality in subphrenic abscess has been and is still considerably higher than that in residual abscesses located elsewhere in the peritoneal cavity. The mortality rate in the reported cases varied from 23 to 100 per cent. (Douglas, 33 per cent.; Hodges, 50 per cent.; Schwartz, 50 per cent.; Eicher and Kibzey, 50 per cent.; Bauman, 56 per cent.; McEachern, operated cases 33 per cent., non-operated cases 75 per cent.; Tuft, 66 per cent.; Lotsch, operative cases 33 per cent., unoperated cases 100 per cent.; Fifield and Love, 50 per cent., operated cases 32 per cent.). As suggested above, this high mortality is probably due to several factors: (1) Because of the relatively inaccessible location of the abscess a diagnosis is made relatively late; i.e., not until toxemia has become well established; (2) because of the intimate relation of the inflammatory process to two large serous cavities, the possibility of infection occurring in either one or both of these cavities as the result of rupture or extension of the process is great; and (3) as a result of operative incision and drainage of the suppurative process through one of the large neighboring serous cavities, secondary infection of these with the resulting increase in toxemia very frequently occurs. Even though empyema or peritonitis in themselves may not cause the death of an individual, an infection of either one of these large serous cavities in addition to the localized process in the subphrenic area may produce death.

Treatment.—The treatment of subphrenic infection may be di-

vided into three stages: 1. Prophylactic, 2. Conservative, and 3. Operative.

1. *The prophylactic treatment* of subphrenic infection is extremely important, and considerable can be accomplished in the prevention of this condition if prophylaxis is properly adhered to. The placing of all patients with suppurative processes within the peritoneal cavity in the Fowler's position will minimize the incidence of subphrenic infection. Coffey has shown that with a patient lying on his back either flank holds more than the pelvis and that in order to drain the fluid from the flank into the pelvis the body must be elevated to an angle of 60 to 70 degrees. Coughlin, from experiments on cadavers, found that with the body in the horizontal position fluid poured into the abdomen was deepest in the region of the eleventh and twelfth ribs. Even after raising the body to an angle of 40 degrees fluid was still present in both loins. In addition to placing the patient in the Fowler's position, large quantities of fluid should be given either subcutaneously or intravenously in order to dilute the purulent secretion within the peritoneal cavity and wash the material into the pelvis. The conservative treatment in many cases of appendicitis will prevent many subphrenic infections. Fifield and Love found that in 228 cases of ruptured appendicitis treated conservatively subphrenic abscess occurred in only one case, whereas in 1,109 cases subjected to immediate operation seven were complicated by subphrenic abscess.

2. *Conservative or Non-operative Treatment.*—Because most cases of subphrenic infection subside spontaneously under proper therapy, it is important that all cases, unless there is definite abscess formation, should first be treated conservatively. The conservative treatment consists of immobilization of the affected side by means of adhesive plaster, the application of heat (preferably dry) over the involved area and the symptomatic treatment of the toxemia. In by far the majority of cases in which conservative treatment is instituted early the infection will subside spontaneously and will not progress to suppuration.

3. *Operative Treatment.*—Operative treatment, *i.e.*, incision and drainage, is indicated in those cases in which suppuration has occurred. This is evidenced by persistence in signs of systemic infection, such as hectic type of temperature, marked in leukocytosis, and

and Rowlands stated that in performing the retroperitoneal opera-
tion it is safer to excise only the distal half of the twelfth rib,
"because the pleura often extends below the neck of the last rib
where it is liable to be wounded." There is, however, no danger
of such injury if care is taken to resect the twelfth rib subperi-
osteally, which is readily accomplished. It is, however, imperative
that the subcutaneous incision be not continued through the bed
of the twelfth rib, but that a transverse incision be made at the level
of the spinous process of the first lumbar vertebra, which is invari-
ably below the reflection of the pleura, as shown by the researches
of Melnikoff. The advantage of the retroperitoneal operation as
opposed to the transpleural route is demonstrated by cases reported
by Doherty and Rowlands. Modifications in the retroperitoneal
drainage have been made by Graf and Elkin; the former consists
of mobilization of the pleura from the upper surface of the dia-
phragm until the portion of the diaphragm covering the abscess is
exposed. Drainage of the abscess may then be accomplished through
the diaphragm without entering the pleural cavity. I can see no
advantage in this procedure and believe that there is a distinct dis-
advantage in that drainage is not in the most dependent portion,
which is one of the advantages of the retroperitoneal drainage.
Elkin, employing the same approach as that advocated by Nather and
the author, attempts to obliterate the costophrenic angle of the pleura
by suture, draining the abscess through the obliterated costophrenic
angle at a second stage. This procedure, even though successful in
one case of Elkin's, has the disadvantage that the pleural cavity is
traversed and there is, at least potentially, a danger of infection of
this large serous cavity. It is obvious from the results obtained by
the retroperitoneal route that this procedure is to be preferred to
the other operative technics in that it is surgically sound and accom-
plishes drainage of a subphrenic abscess, both suprahepatic and
infrahepatic, without traversing the pleural cavity or entering an
uninvolved portion of the peritoneal cavity. The advantage of the
retroperitoneal operation over the other methods is further shown
by the results obtained by the author in nineteen cases of subphrenic
abscess in which this procedure was used. There was only one death,
a mortality rate of 5.2 per cent. In three cases abscesses occurred

concomitantly in the "right posterior superior" and the "right inferior spaces."

Subphrenic abscesses which point anteriorly or which arise from the "right anterior superior" space or the "left anterior superior" space are best drained through the anterior abdominal wall in the manner described by Clairmont, which is also an extraperitoneal procedure. An incision made along the costal margin is carried down to the peritoneum. The peritoneum is then carefully separated from the anterior abdominal wall and the under surface of the diaphragm until the inflammatory process is encountered. The abscess is opened bluntly in a manner similar to those drained posteriorly. In this way the abscess may be drained without contamination of an uninvolved portion of the peritoneal cavity or without traversing the pleural cavity. Fortunately, in most cases of subphrenic infections pointing anteriorly adhesions have already formed between the abscess cavity and the parietal peritoneum, a circumstance which facilitates drainage.

CONCLUSIONS

1. Subphrenic infection is not an infrequent complication of a suppurative process within the peritoneal cavity. Rarely subphrenic infections are hematogenous.

2. Lesions within the abdomen which most frequently give rise to infections in the subphrenic space are acute appendicitis, lesions of the stomach and duodenum, and affections of the biliary tract.

3. The "right posterior superior" space and the "right inferior" space are the most frequently involved subphrenic areas.

4. The diagnosis of subphrenic abscess is not difficult if the condition is merely kept in mind and considered by the physician. In all patients in whom there has been a preceding suppurative process within the peritoneal cavity and in whom constitutional signs of infection continue, the possibility of a subphrenic infection must be considered. In those cases in which the infection is limited to the "right posterior superior" space, a persistent localized point of tenderness over the right twelfth rib is of great diagnostic importance. Roentgenologically, immobility and elevation of the diaphragm on the affected side are of value.

5. Exploratory aspiration should never be resorted to in suspected cases of subphrenic infection.

6. The majority of cases of subphrenic infection subside spontaneously and do not progress to suppuration.

7. The treatment of subphrenic infection is divided into (1) prophylactic, (2) conservative, and (3) operative.

8. The operative treatment of subphrenic abscess consists of drainage of the suppurative process without contamination of either of the uninvolved large serous cavities; *i.e.*, the pleural or the peritoneal. This is best accomplished in the cases in which the process is located in the "right posterior superior" and the "right inferior" spaces by the retroperitoneal operation. In those cases pointing anteriorly an extraperitoneal procedure may be accomplished.

9. Employing the retroperitoneal operation a mortality rate of only 5.2 per cent. has been obtained in cases of subphrenic abscess.

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CYSTS OF THE PANCREAS WITH THE REPORT OF ONE CASE*

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THE diagnosis of any abdominal condition, particularly of any obscure abdominal condition, requires the consideration of rare diseases as well as of common diseases with atypical symptoms and signs. An orderly mental rehearsal of all possible conditions, even the most unlikely, may be a mechanical procedure, but a conclusion can sometimes be arrived at by elimination when all other methods fail, and in more than one instance I have seen an obscure diagnosis cleared up by this simple measure. Naturally, the chances are that the pathology is of the ordinary variety, but rare conditions must constantly be recollected and eliminated, on the premise, to speak colloquially, that any pack may hold a joker.

Among unusual conditions of the upper abdomen pancreatic cysts must always be considered. These are comparatively uncommon tumors. Hale White found only four in 6,000 autopsies performed over an eleven-year period at Guy's Hospital, and only three such cases are filed in the record room of Charity Hospital in New Orleans over a twelve-year period, during which time the admissions numbered more than 270,000. Judd, in 1921, reported forty-one cases from the Mayo Clinic, which would seem to suggest a rather higher incidence. The obvious explanation is that no statistics, however carefully collected, are entirely reliable. Undoubtedly, many cases are never reported, others are incorrectly diagnosed or escape detection altogether, and it may be, as Graham points out, that all cases reported as pancreatic cysts are not correctly reported. Be that as it may, there is no question as to the rarity of this type of tumor; it is decidedly infrequent.

The classification, made by Robson and Moynihan in 1903 and still generally accepted, includes the following groups:

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(1) *Retention cysts.* These originate from an obstruction in a pancreatic duct or an acinus, and the pathology is due simply to a fluid accumulation. They may or may not be lined with epithelium; if they are not, many observers believe that the epithelial lining was originally present and has disappeared under the pressure of the accumulated fluid.

(2) *Proliferation cysts.* These are of the true cystadenomatous type and are akin to similar cysts in the thyroid or the ovary. They arise from a proliferation of the glandular epithelium plus a retention or accumulation of its secretion, which is poured out in quantities far above normal. This type of growth can undergo malignant degeneration, as would be expected from its tendency to papillary ingrowth, and three such instances included in Cullen's report of seven cases prove the importance of this point.

(3) *Hemorrhagic cysts.* These may be of traumatic origin or may follow true pancreatic apoplexies, the latter type being easily recognized by the acute symptoms characteristic of the onset. They must be distinguished from simple retention cysts into which hemorrhage has occurred either as the result of trauma or as the result of the corrosive action of the pancreatic fluid on the walls of the blood-vessels.

(4) *Pseudocysts.* These are likewise due to trauma but they arise outside of the actual pancreatic structure, and, according to Körte, who is quoted by Primrose, they are usually caused by an effusion of pancreatic fluid into the lesser peritoneal sac. Differentiation from true cysts is not always possible, for in neither type are the findings constant, and many observers agree with Judd that the distinction can be accurately made in most cases only at autopsy.

(5) *Congenital cysts.* These are extremely rare and may or may not be apparent in infancy.

(6) *Hydatid cysts.* These are very rare, and in their diagnosis (Graham) a positive complement fixation test in the serum is of great value.

(7) *Dermoid cysts.* This group was added by Judd, who reported one such case in 1921, the diagnosis being made on the presence of hair and a tooth. A similar case has since been reported by Dennis.

In both retention and proliferation cysts the common factor is

some obstruction to a pancreatic duct, though what the primary cause of the obstruction is cannot always be determined. The preëxistence of either acute or chronic pancreatic disease is significant, and the contention seems reasonable that disease of the chronic interstitial type is peculiarly likely to underlie cyst formation because the resulting fibrous tissue and contraction tend to produce pressure on the ducts. On the other hand, as Judd points out, the chronic pancreatitis practically always found in association with cysts of the pancreas may quite as well be an effect as a cause. The relationship between pancreatitis and biliary disease which has long been known to exist is likewise frequently apparent in many cases of pancreatic cysts. In seventeen of the forty-one cases reported by Judd biliary disease was either a factor at the time of operation or had preceded the development of the tumor, and in my own case the chronology, as I shall point out later, is quite interesting.

Cysts of the pancreas may occur at any period of life from infancy to senility, though they are most usual in middle life. The sex incidence is practically equal. They may be unilocular or multilocular, single or multiple, and they vary in size, some being as small as a pigeon's egg, others filling most of the abdominal cavity. The average cyst is the size of a child's head, but, as in the development of ovarian cysts, theoretically the size would seem to be limited only by the distensibility of the abdominal wall and the secretion from the proliferating epithelium.

The contained fluid is usually brownish as the result of hemorrhage, but occasionally, as in my own case, it is clear. It is always viscid. The constituents include mucin, cholesterol or some similar bile derivative, epithelial cells, fat, blood-cells and necrotic tissue. The fluid is alkaline in reaction and of medium specific gravity. One or more of the pancreatic enzymes may be present, but various digestive tests may be entirely negative for these agents.

Pancreatic cysts are likely to cause marked distortion of the abdominal contents. According to Körte, quoted by Cullen, three main tendencies of growth are noted:

(1) Cysts developing in the lesser peritoneal cavity grow between the stomach and the transverse colon, pushing the colon down and the stomach up.

(2) Cysts developing from the upper border of the pancreas

grow above the stomach, making their way between it and the liver, and pushing the gastrohepatic ligament forward.

(3) Cysts developing between the layers of the mesocolon force the transverse colon forward or upward.

Variations of any of these positions, of course, are possible. In one remarkable case (Hagen, quoted by Primrose) the distortion of the abdominal contents was so extreme that the surgeon could reach the cyst only after he had divided the stomach. Adhesions are frequent, chiefly to the stomach, the transverse colon and the great bloodvessels, and in one instance (Robson and Moynihan) the portal vein was found firmly embedded in the cyst wall.

The symptoms at first are suggestive of mild gall-bladder disease and are not distinctive. There is usually a prolonged history of indigestion and abdominal discomfort, with flatulence and loss of appetite, accompanied by progressive loss of weight. Pain is not always a feature; if it is, it is usually noted in the epigastrium and may be referred to the back or to the right or left hypochondrium, according to whether the tumor is located in the head or the tail of the pancreas. As a rule, all symptoms are due to pressure on adjacent organs rather than to intrinsic pathology, though some writers make the point that the attacks of vomiting rather characteristic of the disease may quite as well be due to pancreatitis as to the pressure on the stomach to which they are usually attributed. Jaundice may be caused by obstruction of the bile-ducts as a result of pressure, and diabetes and glycosuria are noted if the main pancreatic duct becomes obstructed and there is subsequent involvement of the islands of Langerhans. A sudden enlargement of the tumor, accompanied by acute pain and shock, is always the result of hemorrhage into the cyst, while a sudden diminution in size, with shock and profuse diarrhea, indicates rupture into the bowel. If the diarrhea is absent, it is probable that the rupture has occurred into the peritoneal cavity.

Diagnosis, once considered rather difficult, is no longer so regarded since the condition has been identified as a definite clinical entity. The symptomatology is not distinctive, but, as we have pointed out, the physical findings are. The most characteristic sign is a progressive enlargement of the upper abdomen, with tumor formation, between the xiphoid cartilage and the umbilicus. The mobility of the tumor is not markedly affected by respiration, but a

fluctuation wave can usually be elicited unless the tension is very great. X-ray examination is a confirmatory measure: a study of the shadows of the stomach and colon almost invariably reveals the presence of some extrinsic mass which is causing a pressure deformity of these organs. The laboratory is of little aid, for urinalysis and the ordinary blood examinations show few departures from the normal. The blood amylase test for pancreatic dysfunction, devised by Graham, is most ingenious and should be very helpful in the occasional obscure case, but it need not be resorted to routinely, both because the diagnosis is evident without it, and because, as it must be done at present, it is too technical to be employed outside of an unusually well-equipped laboratory. The differential diagnosis includes mesenteric and omental cysts, retroperitoneal tumors and certain new growths of the ovary.

Symptomless pancreatic cysts are seldom detected and so demand no treatment. On the other hand, when once the diagnosis has been made, treatment is always indicated and must always be surgical. Complete extirpation, the ideal course, is not always practical, because the profuse bleeding usually initiated by attempts at removal and the adhesions to adjacent structures frequently present make the technical difficulties very great. In addition, extirpation may involve the removal of so much of the pancreatic structure as to make subsequent diabetes a possibility to be seriously considered. Growths situated in the tail of the pancreas seldom present these difficulties, but the removal *in toto* of growths within the head or the body of the gland is another matter. Enucleation of the lining membrane is a practical and desirable procedure when the connection between the layers of the wall is not so intimate as to make it impossible. Tapping is never justified.

Most often, drainage by marsupialization is the procedure of necessity, if not of choice, and the results are frequently good. Only drainage was done in thirty-one of the thirty-nine surgical cases reported by Judd, and in his opinion these patients recovered quite as satisfactorily as those on whom more radical operations were undertaken. The disadvantage, and it is no small one, is that drainage is likely to be a very long-drawn-out affair—in one reported case it lasted for fifteen years—for it continues until the epithelial lining has been completely destroyed and the cavity obliterated by *adhesions*

of the walls after collapse. Aside from the mechanical inconvenience of life with a drainage tube in one's abdomen, there is also to be considered the fact that a dermatitis is inevitable if the fluid contents of the cyst contain pancreatic ferments, and that in some cases actual digestion of the skin may occur.

The case herewith reported is put on record not because it is a pancreatic cyst but because of several unusual features associated with it, which may be briefly summarized as follows:

(1) While most patients with pancreatic cysts experience considerable annoyance, albeit their complaints are frequently vague, this young woman had very slight symptoms. She told a story of occasional epigastric distress, and just before she submitted to operation there was a rather constant aching in the left lumbar region, but there was no record of the digestive symptoms usually associated with the condition, though the cyst was very large, easily the size of a watermelon when first attacked, and X-ray study showed a marked pressure defect on the greater curvature of the stomach. The temperature elevations noted at intervals prior to the first operation were assumed to be due to an intermittent enlargement of the cyst with a mild inflammatory reaction. They were not marked, however, and the discomfort of the progressively enlarging tumor was really the chief factor in the patient's decision to seek medical attention.

(2) Pancreatitis is said to be an almost invariable concomitant of pancreatic cysts, but in this instance no story of preëxisting disease could be elicited, nor were there any signs of this pathology during the entire period the patient was under observation. Moreover, the portion of the pancreas (about three-fourths) which remained after excision of the cyst, when carefully inspected, was apparently normal in all respects. Since no story of trauma could be elicited, aside from the fact that the non-hemorrhagic character of the cyst contents was against this hypothesis, the etiology of this particular tumor remains entirely obscure.

(3) The frequent association of biliary disease and pancreatic cysts has already been commented on. In this case the association was intercurrent, not antecedent or coincident. The gall-bladder was reported as normal by the radiologist in his preliminary study, and was normal on palpation at the first operation. Yet two years

later, radiologic study done for quite another purpose (the patient having exhibited no symptoms of biliary disease) showed clearly three gall-stones, and operation some months later revealed these stones as well as several smaller ones. The patient, in the interim, developed symptoms, not the usual gall-bladder syndrome but chiefly moderately severe pain, characteristically located. Ordinarily I should not operate on a history of such mild symptoms, but in this instance I felt justified, for this patient unquestionably had a type of biliary pathology which would later inevitably cause trouble, and, in view of the serious condition already existent in the pancreas, I felt that prophylactic surgery was perfectly justified. I must confess, also, that I was not sorry to have an opportunity to determine directly the actual outline and location of the cyst, for the question of its complete removal was already being broached by the patient.

(4) The prolonged drainage—more than three years—is worthy of note, though cases of far longer duration have been reported. It is fortunate that there were no pancreatic ferments in the cyst contents, for otherwise protection of the skin over such a period would have been a real problem. The patient was quite comfortable during the entire period, except for the mechanical discomfort of the drainage and the occasional fever caused by stoppage of the tube, but the effect on her nervous system was progressively bad.

(5) The final operation was unexpectedly simple. I had been loathe to attempt extirpation, realizing the possible difficulties, but the patient was insistent, and, as events proved, was justified in her willingness to assume the risk. There were no adhesions to neighboring structures and it was possible to shell out the cyst lining, leaving the rind, so to speak, with surprisingly little difficulty. The subsequent complete cure has been most gratifying.

<div align="center">CASE REPORT</div>

A. B. S., white, female, occupation, registered nurse, single, aged thirty-two. First admission, June, 1927. Stay, twenty-five days.

The patient's previous history was without bearing on the present condition. A mass in the left side had been first noted eleven months ago, the day after rather severe epigastric distress had been experienced. It was then about the size of the hand and it had remained that size and without symptoms until a month before admission, when it had begun to enlarge, and the patient had since experienced a constant aching in the left lumbar region. Recently there had been an afternoon temperature of 100° to 102°. The physical examination

was negative except for the presence of a large, rounded, irregular, fluctuant mass extending from the left costal margin to three inches below the umbilicus.

X-ray examination showed a marked distortion of the esophagus at the point of entrance into the diaphragm. It was pulled far to the left and entered the fundus lateral to the diaphragmatic dome. The stomach showed an exaggerated deformity, there being a pressure defect on the greater curvature which caused the organ to ride upward and to the right, around a very large mass occupying the area just below in the left flank. The pylorus lay just above the right iliac crest. There was no gastric retention at the six-hour examination, but the opaque meal had not yet entered the caecum. A plain radiogram showed the liver normal in size at the lower portion. The shadow of a very large mass could be observed in the left flank, reaching the pelvic brim and obscuring the structures on that side. The impression obtained was of an intra-abdominal rather than a retroperitoneal tumor.

Laboratory examinations (urinalysis, phenolsulphonphthalein test, total and differential blood count, blood chemistry) were essentially negative except that the blood showed a very mild anisocytosis.

At operation through a left rectus incision, after a large amount of free gelatinous fluid had been suctioned out of the peritoneal cavity, the cyst was found still intact. Its boundaries were the under side of the liver, the diaphragm, the left splenic fossa and the stomach, which, as shown radiographically, was markedly displaced to the right. Marsupialization was done and a large rubber drainage tube was inserted, surrounded by gauze packs. The cyst was fully as large as a watermelon but as the fluid was not evacuated because a sudden reduction in the intra-abdominal pressure was not considered safe, its capacity could not be estimated. A section of the wall was excised for examination. At this time the gall-bladder was found entirely normal on palpation.

The patient made an excellent recovery. Drainage was profuse from the beginning, and elevations of temperature after attempts to replace the original drainage tube with smaller tubes or with gauze packs offered convincing proof that closure of the wound could not be expected for a very long time. The patient was therefore discharged on the twenty-fourth day, with the drainage tube still *in situ*.

The pathologist reported the cyst contents to show serum, fibrin and neutrophiles. There were 1.66 units of bilirubin per cubic centimeter. Cultures were negative. Microscopically, the wall was seen to be made up of dense connective tissue with small projections of epithelial cells exhibiting a cytoplasm suggestive of that of the pancreatic duct.

Second admission, March, 1929. Stay, five days.

The patient returned with a story of slight but persistent drainage since the operation. Exploration of the cyst cavity under anesthesia showed no evidence of foreign material to explain the continued drainage, and the opening was therefore slightly enlarged and a larger tube inserted. There was no story of fever at this time.

Third admission, February, 1929. Stay, six days.

The patient returned with a story of continued drainage, with occasional blockage of the tube accompanied by temperature elevations to 102°. Under the fluoroscope only about five cubic centimeters of lipiodol could be injected into

the cyst, and it was therefore concluded that the entire cavity had not been filled. Radiologic study showed the lipiodol divided into small islands, suggesting loculation. At this time the mass previously described appeared about the size of an orange and still deformed the stomach by pressure on the greater curvature side. Also at this time the gall-stones were detected, as already described, and comparison of the films made previously showed that they had not existed two years previous.

Curettage of the cyst cavity was done and the drainage tube was replaced.

Fourth admission, October, 1929. Stay, fourteen days.

The patient returned with the cyst still draining through the tube and with a story of attacks of moderately severe pain entirely characteristic of gall-stone colic. There had been an afternoon elevation of temperature for the last six weeks, ranging from 99° to 100.5°.

At operation, the gall-bladder was found large, rather thin-walled, full of stones, and adherent slightly and in parts to the common duct. Cholecystectomy was done. Exploration showed the cyst of the pancreas to occupy the lesser peritoneal sac and to be about the size of a grapefruit. It was very thick-walled and apparently originated in the tail of the pancreas.

Convalescence was without incident.

Fifth admission, November, 1930. Stay, twenty-one days.

The patient returned reporting a marked improvement in her general health since cholecystectomy, but with continued drainage of the cyst. She now asked that an attempt be made at extirpation of the tumor, and she persisted in her request although warned of the possible dangers of the operation. As already described, however, removal proved surprisingly simple. Her convalescence was smooth and she was discharged with the drainage tube still *in situ* and with instructions to withdraw it about half an inch weekly.

The pathologist reported the growth to be a cystadenoma, the chief histology being characteristic of new growths of a benign nature, though occasional areas were observed in which an infiltrative tendency was apparent.

February 5, 1930.—The patient reported that drainage had continued for one month after her discharge, but that at the present writing the wound was perfectly healed and her health excellent.

Note.—The preoperative diagnosis of pancreatic cyst was correctly made by Dr. James D. Rives, who referred the patient to me. The radiologic studies were made by Dr. W. F. Henderson and the laboratory studies by Dr. John A. Lanford, both of Touro Infirmary.

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I. INCISED WOUND OF PALM—SEVERANCE OF MEDIAN NERVE. II. HODGKIN'S DISEASE. III. FRACTURE OF LUMBAR VERTEBRA. IV. FRACTURE OF BOTH BONES OF THE FOREARM. V. FRACTURE OF THE HUMERUS. VI. PITUITARY DYSFUNCTION— CHRONIC APPENDICITIS?

By ISIDORE COHN, M.D.

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I. INCISED WOUND OF PALM—SEVERANCE OF MEDIAN NERVE— IMMEDIATE NERVE SUTURE

CASE I.—Mr. S. C., aged twenty-eight years, was admitted to Touro November 15, 1930. The following history was obtained: while opening oysters, the knife slipped and cut the palm of his hand.

This may seem to be too simple a case to present for consideration in a clinic of this kind, yet, when one considers the latent possibilities of a crippled hand, if such a case is not properly diagnosed and treated, no apology will be necessary for offering this type of case for consideration. Too often such wounds are considered trivial and without further ado I have known such wounds to be sutured without even the ritual of an attempted débridement. In other instances, wounds of this character have been known to be débrided and primary suture done. At a later date, the crippling disability, resultant from an unrecognized muscle and nerve severance, has been found and the patient has had to be subjected to a secondary operation which would have been unnecessary if proper care had been observed in the examination at the time of the accident.

On examination of the patient in question it was found that there was a small, gaping, lacerated wound in the middle of the palm of the left hand. There was very little bleeding, but the patient was unable to flex the ring finger particularly. Further examination revealed that there was loss of sensation in the distribution of the median nerve beyond the site of the wound.

The patient was immediately admitted to the hospital and under ethylene anesthesia the primary wound was débrided and an incision about three inches long was made from a point midway between the thenar and hypothenar eminences down to the interdigital fold between the middle and ring fingers. The palmar arch fortunately was not severed. We noted at once that one of the lumbricales had been severed. None of the tendons of the flexor muscles of the fingers had been severed. The median nerve had been completely severed and its edges had retracted. The ends of the median nerve were approximated; very fine silk was used. The belly of the lumbrical muscle was sutured. The wound was closed in tier sutures, first the fat was approximated with catgut and then the skin was approximated with interrupted dermol suture. *A molded plaster splint was applied to the dorsum of the forearm and hand. The hand and wrist were placed in the position of palmar flexion.*

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The various steps which were utilized in the management of this case are characteristic of the method of handling such cases in our clinic. In the first place, every incised or lacerated wound of the hand should be carefully examined for the purpose of eliminating or of finding, if present, evidence of injury to important structures, such as nerves, muscles or tendons.

One need not emphasize injury to blood-vessels as everyone feels it his duty to control bleeding. In fact, it would seem, whether in emergency cases or in deliberately planned operations, that the clamping of blood-vessels is the all-important function of the assistants.

The ease with which a complete severance of a nerve can be recognized makes one wonder that so many wounds are sutured which later have to be reopened because the important injury was not recognized at the time of the accident.

To illustrate the attitude with reference to some of these cases I might cite an interesting incident in connection with the case in question. When this patient was placed upon the operating table, one of the attendants in the operating theater, noting the small size of the wound, commented that it was ridiculous to make a case out of this small wound. This individual was rather surprised and had a complete change of attitude when the severed ends of the median nerve were presented and suture accomplished. When one considers the economic loss when such a case is not managed early, it should make us more thoughtful and more careful in the effort to recognize such injuries at once.

Immediate recognition and immediate suture in the absence of infection results in an early regeneration and restoration of sensation and function. After atrophic changes and contractures have occurred, properly planned operation may eventually restore the individual to a fair degree of usefulness.

I believe that this type of case indicates that no wound is too small nor too simple in character to require the judgment which experience alone can develop. *The management of wounds should not be delegated entirely to the least experienced members of the hospital interne staff, but supervision by one of the staff is essential for good end-results.*

There has been much written about the type of material used for nerve suture. During recent years, Sterling Bunnell, Dean Lewis, Ernest Sachs, De Lageniere and others have consistently advocated the use of fine silk in nerve suture. This has been the material used in my work. I believe that it should be the preferred material because a finer material can be used than if catgut were used, and catgut may be absorbed before firm union can result.

Under certain circumstances in nerve suture a considerable gap must be overcome. This difficulty can be overcome at times with comparative ease by releasing the nerve from its surrounding tissue; in other instances, by changing the bed of the nerve, the usable length of the nerve may be increased.

It is not necessary to use any protective material around the nerve suture. Practically all operators have discarded the various materials which were used for tubulizing. After the suture has been accomplished, it is important that there should be no tension on the suture line, and this may be accomplished by placing the part in such a position as to relax the muscles and tissues in the vicinity of the suture line.

In a median nerve suture such as the one presented in this clinic, the hand should be placed in palmar flexion with the splint on the dorsum of the forearm and hand, thus avoiding the effect of pressure on the suture line.

Interrupted galvanism and whirlpool baths, together with the various forms of heat, are very effective in maintaining circulatory efficiency so essential in the prevention of atrophic changes during the period of repair and regeneration.

In cases of nerve injury where the diagnosis has not been made primarily, the question often arises as to just how much damage has been done, whether there has been a complete severance, or whether the nerve is included in the scar. Discussing this subject a few years ago, Frazier stated that where there was a doubt in his mind he was in the habit of waiting three months to see if spontaneous recovery would take place. It is of great importance to realize that nerve suture may be done as long as three or four years after the primary injury with the expectation of perfect repair and restoration of function. Such experiences have been reported by Bunnell. De Lageniere has reported excellent results from suture as late as twenty-eight months after the original injury.

I recall distinctly one case in my own experience where a neuroma was excised fifteen months after the accident. Immediate end-to-end suture was followed by excellent functional results. The last note made, with reference to this particular patient, stated that she was Night Chief Operator at a Western Union Telegraph office where she used the typewriter without difficulty and had as much power in her right hand as in her left.

Summarizing this case of median nerve suture, the chief points of interests are:

1. That small wounds are not too insignificant for careful investigation for evidence of nerve and muscle damage. Such investigation will reward the surgeon as well as the patient, and will diminish economic loss which would result from incompetent management.

2. After nerve suture has been done, immobilization in a position which will avoid tension on the suture line is essential.

3. Delayed suture does produce good end-results if properly done.

II.   HODGKIN'S DISEASE

The following case of Hodgkin's disease is presented at this time because of the spectacular results which apparently were due to the effect of radium treatment.

The patient, Master L. S., aged thirteen years, was admitted to Touro Infirmary on March 30, 1930. At the time of his admission, a history was obtained of which the following is an abstract:

In July, 1921, the patient had a chill followed by fever and sweats. His blood was examined and the doctor told the family that the child had malaria. There was no response to quinine medication. After a few days the chills and fever returned. Since that time he had an irregular temperature. He had periods of well-being at intervals. In spite, however, of the fever, he went to school regularly. During February of 1930 he withdrew from school and remained in bed at home from that time until his admission to Touro. On the day before his admission to Touro he had a chill and his temperature was 102°. He has lost at least ten pounds in weight. He has had no cough, expectoration, nor any respiratory discomfort.

The physical examination, which was made by the medical service, under the supervision of Dr. I. I. Lemann, the Director of the Medical Department, is abstracted: "The patient is undernourished. The face is flushed, the skin moist

and hot. The chest is symmetrical, no dulness; breath sounds are rather harsh, no râles. Heart not enlarged. Rate 120, regular, no murmurs. Liver one and one-half fingerbreadths below costal margin, spleen two fingers below costal margin. No enlargement or tenderness over any of the bones or joints."

Axillary adenopathy of slight degree, no epitrochlear, cervical and inguinal glands involved. The original impression, as noted on the chart, is malaria or chronic myelogenic leukemia.

On March 30 the total white count was 20,000 with a differential of 89.5 polynuclear leukocytes.

The progress note made at this time states: "This points to a collection of pus somewhere, very likely. From the history and physical findings I cannot rule out a possible infection. Blood taken for agglutination tests with B. abortus and melitensus as well as typhoid and paratyphoid." (Lemann.)

On April 1 a progress note was made as follows: "Lymph-glands just above the left clavicle about as big as the end of my index finger. Another gland above the right clavicle at its inner end a little smaller than the one on the left. The entire cervical glands are enlarged as well. The glands are discrete, freely movable, and not attached to the skin.

Lungs are normal. Electrocardiogram was ordered and the report showed no definite evidence of myocardial disease.

Doctor Cohn was asked to see him and he recommended the removal of a gland for diagnostic purposes, as the patient had discrete enlarged lymph-nodes associated with irregular temperature, weakness, and an enlarged spleen together with a leukocytosis which was actually a polymorphonuclear leukocytosis.

On April 2 an X-ray examination was made of the chest, and the radiologist reported that the "superior mediastinum is filled with a large, irregular mass." This mass was not an expansile tumor.

The tumor seemed to be developing along either side of the trachea, and Doctor Henderson, the radiologist, stated: "The changes are very suggestive of a thymoma, although Hodgkin's cannot be ruled out."

On April 4 a lymph-node was removed and sent to the laboratory for histological examination. At this time, the child's temperature was rather high, varying between 101° and 104°. He continued to run an irregular temperature, as will be seen by the chart, until May 5.

After the report was received from the laboratory that the histological findings indicated Hodgkin's disease, I advocated radium packs and Coley's toxins. On April 25 it was noted that there were sonorous râles over both sides of his chest.

On May 3 "the cough has grown increasingly worse during the past week, and the patient has grown weaker. There is marked dulness over both lungs from the apex to the level of the third dorsal vertebra. There is diffuse bronchial fremitus over the entire chest with many sonorous râles. The glands in the right cervical region have grown considerably larger." At this time the patient had dyspnea and at times he became cyanotic. He was unable to void voluntarily, and members of the urologic service found it necessary to allow a retention catheter to remain.

The patient's suffering was intense and his fever persisted. Doctor Lemann then consented to allow the use of the radium as he felt that it was not safe to wait longer for a spontaneous remission of temperature.

On May 4, 100 milligrams of radium for twenty-four hours were applied over the entire chest wall at a two-inch distance, using lead screens to protect the face and neck.

On May 8, 100 milligrams of radium for twenty hours were applied between the scapulae. By this time, May 8, his temperature had dropped to less than 100°. Child was more comfortable than before.

On May 11, 100 milligrams of radium for twenty-four hours were applied over the left side of the neck. The notes at this time stated that the patient "appears to be progressively becoming worse."

On May 13 the following notes were made by Doctor Lemann: "Patient appears weaker than when I left him ten days ago, still coughing, although not quite as much as before." *By this time the patient's temperature was running consistently lower than 100°.*

On May 16, 100 milligrams of radium for twenty-four hours were applied to the right side of the neck.

On May 21, 100 milligrams of radium were applied to the upper part of the abdomen for twenty-four hours.

On this date Doctor Lemann made this note: "The child is very much improved, his appetite has increased, he is cheerful, and he is able to be up in a chair. *Although I was skeptical as to the relief to be obtained from radium, I wish it to go on record that its use is well worth while even if improvement is only temporary."*

On June 7 the patient was allowed to go home, and the following notes were made: "The patient continues with this remarkable improvement. He seems to enjoy his surroundings and he is not complaining."

From May 16 until May 23 the maximum of his temperature was 99.4°. From that day until the discharge from the hospital on June 9, his temperature never rose above normal.

The child received a total of 16,800 milligram-hours of radium in the form of radium packs.

There are several interesting deductions which one might make from this individual case. In the first place, the problems presented by a study of Hodgkin's disease show that it is an orphan in the family of diseases and thus far a proper guardian has not certainly been found. In an attempt to prove its paternity, many organisms have been described, as well as disturbed cell growth which would place it in the class of malignancies. This controversy has waged backward and forward from infections to malignancies, for a time each having the ascendency, with the result that treatment has varied greatly. Medical measures, surgical removal and radiotherapy have been utilized. It seems that, at present, these cases are under the guardianship of radiotherapists. It is considered by many authorities today to be an infectious process.

Not only is this disease fascinating from the standpoint of treatment, but the clinical aspects present many problems—problems which are perplexing and which are not always solved until the final curtain has been drawn, and even then our pathologists are not entirely agreed on the histologic evidence presented.

The clinical picture which we have been taught to expect is not always present in its entirety, and in some cases the manifestations which enable one to recognize the case as Hodgkin's are late manifestations; and, conversely, there are some cases which present the clinical syndrome commonly supposed to be

characteristic of Hodgkin's which proves by biopsy to be tuberculosis or lymphosarcoma.

There are certain clinical phenomena which should be more generally considered: (1) The febrile reaction; (2) the skin lesions; (3) the character of the glandular enlargement; (4) the blood-picture; and (5) the group of cases which during life defy recognition because of the absence of superficial lymph-node involvement. (Retroperitoneal type of Hodgkin's disease.)

The febrile reaction is of utmost importance because many cases probably remain undiagnosed as Hodgkin's and are classified as infections of other sorts. More than that, the *febrile reaction may make others hesitate to give the patient the benefit of radium treatment for fear that it will have a deleterious effect. I believe that this particular attitude should be avoided and certainly in the case presented, whether it be coincidental, and it is difficult to believe that it was coincidental, there was a marked and spectacular drop in the temperature following radium applications.* I have never seen anything more spectacular than the change in the attitude of this patient, his relief from dyspnea, the diminution in his cough and the lack of the necessity for using hypnotics which followed the radium applications.

Anyone who had had the opportunity of seeing this patient, apparently moribund, could not help being impressed by his general improvement and by the disappearance of his temperature. While he has some small palpable cervical lymph-nodes, the spleen and liver are not palpable, and he seems to be well.

The child is being kept constantly under observations and if any glandular enlargements are noted radium packs will be used.

Following the suggestion of such men as Burnam we do not apply radium over the gland-bearing areas unless there is evidence of glandular involvement.

Another interesting point in connection with the clinical manifestations is the character of the lymph-gland enlargement. It should be generally appreciated that the glands often remain rather small, discrete, not painful, and not adherent to the skin. When large masses are found, the disease has progressed to the late stage, although such a thing may not be present at any stage of the disease. I have observed Hodgkin's cases in which the glands did not reach a considerable size, and in the retroperitoneal variety superficial lymph-nodes may not be found palpably enlarged at any stage of the disease.

The blood-picture in Hodgkin's disease is, at times, a disturbing factor because it is not sufficiently appreciated that a marked polymorphonuclear leukocytosis is a characteristic finding. Yates and Bunting many years ago called attention to the fact that there might be as much as 100,000 total white count with 90 per cent. polymorphonuclear leukocytosis. It is one of the few diseases in which so high a polymorphonuclear leukocytosis is found in the absence of pus. This particular finding is one of the strong points in favor of the disease being considered, as I believe it is at the present time rather generally an infection.

Barron, in the *Archives of Pathology*, November, 1926, stated that no tissue of the body is exempt from involvement in Hodgkin's disease. Symmer believes that bone marrow is affected in every case. Turnbull states that the bone marrow was affected in 49 per cent. of the cases. He thinks that the femur is most often affected. Coley agrees with this statement of Turnbull.

While it is true that all authorities agree that the prognosis is always hope-

less, radium treatment has proven effective in prolonging the life of the patient affected with this disease.

Burnam believes that the reduction in the size of the glands is more rapid from the use of radium than deep X-ray therapy. The effect is produced more rapidly and with less upset to the patients. Coley advocates radium and toxins, and it has been my policy to use the combination of radium and Coley's toxins.

III. VERTEBRAL FRACTURES—FRACTURE OF THE FIRST
LUMBAR VERTEBRA

This case is presented because the findings emphasize the necessity for considering every back injury serious enough to require an X-ray investigation. The patient in question is a robust young man of nineteen years. During the afternoon he fell from a roof and struck his back on a cement floor. When helped to his feet, the patient found that he had pain in his back when he walked.

On examination we found that there was no difference in the length of the two lower extremities, nor any alteration in the contour of the lower extremities. There was no limitation of motion of any of the joints of the extremities. Inspection of the back did not reveal any evidence of ecchymosis nor change in the contour, nor was there any evidence of spasticity of any of the muscles of the back. The reflexes were not altered.

An X-ray picture revealed a fracture of the first lumbar vertebra.

Because of the absence of localized pain, and spasticity, and the fact that there was no limitation of motion of his vertebral column, it seemed hardly likely that a fracture of a vertebra existed. However, the picture was taken and as soon as the picture was developed evidence of a compression type of fracture of the first lumbar vertebra was found. (Fig. 1.)

A spinal puncture was done. The spinal fluid was clear, not blood-tinged, and the manometric reading was not elevated. There was no evidence of spinal block. A plaster cast was applied.

The lack of clinical phenomena in this case, as in many others, permits some of these fractures of the vertebra to go unrecognized until it is too late to overcome deformity and compression phenomena.

In connection with this case I might cite two others: first, a Miss L. W. was injured in an automobile accident, March, 1929. She complained of pain in her back. Immediately following the accident she was examined by a physician in the town where the accident happened. He advised the young lady and her family that she had a contusion of her back. On the fourth day after the accident she returned to New Orleans, at which time she consulted Dr. C. Jeff Miller, who advised her to have an X-ray picture. The picture showed a fracture of the tenth vertebra. I was asked to take charge of the case by Doctor Miller.

On examination, I found a painful area over the region of the spine from the sixth to the tenth dorsal vertebrae. There was a soft swelling with some ecchymosis. Spinal puncture was done and the manometric reading was found to be from 8-10. The Queckenstedt phenomenon showed no evidence of spinal block. When pressure was made over the jugulars the spinal reading rose immediately to 20 m.m. on the mercury manometer.

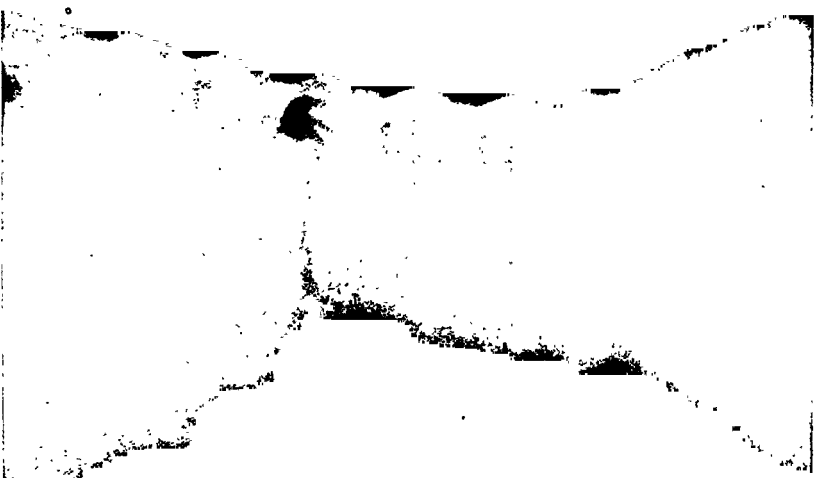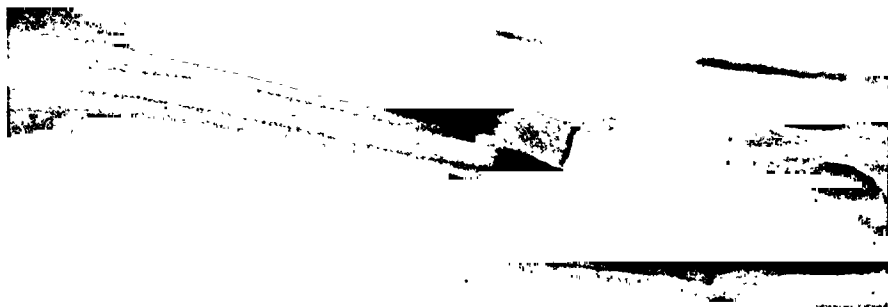A plaster jacket was applied, and this the patient wore until June 1, after

Fig. 1.

Case III.—December 24, 1930. Mr. P. M. Fracture of first lumbar vertebra.

Fig. 2.

Case V.—April 5, 1929. Mr. F. Fracture of first lumbar vertebra.

Fig. 5.

CASE IV.—January 12, 1931. Master J. M. Fracture of both bones of forearm. After application of Lane plate.

Fig. 4.

CASE IV.—January 12, 1931. Master J. M. Fracture of both bones of forearm. Before reduction.

Fig. 3.

CASE IV.—January 12, 1931. Master J. M. Fracture of both bones of forearm. Before reduction.

which time a molded leather jacket was made which she wore until October 1, 1929.

At the present time, this young lady has no limitation of motion in her back. She swims, plays tennis and is able to take part in all athletic exercises.

The next case, Mr. F., was injured in an auto accident and he too was told by the examining physician that he had a contusion of his back. This gentleman *walked about for seven days*. Because of the findings in his niece's case, he was referred to me by Dr. Joseph Hume, a personal friend of the patient.

Inspection of the X-ray picture taken revealed a marked deformity of the first lumbar vertebra. On examination, we found spasticity of the erector spinae muscles on the right side, but no spasticity on the left. There was a point of tenderness over the first lumbar vertebra; the patellar reflexes were exaggerated. A spinal puncture revealed a manometric reading of 14 m.m., without spinal block. A plaster cast was applied. (Fig. 2.)

When last seen, the patient had no limitation of motion, no pain, and he had returned to his ordinary activities, which include hunting, golfing and fishing.

These three cases certainly illustrate the importance of early X-ray examination of all back injuries. Even when there is nothing to suggest an increased intraspinal pressure, pictures will reveal a compression type of fracture of the body. These cases should have proper support for their backs in the form of plaster body casts or leather jackets. During the time that the patient is on his back proper care should be taken that decubitus from irritation is avoided. The handling of the patient is made easier by the use of a modified Bradford frame with collapsible legs, which may be raised from the mattress so that the patient does not have to be unnecessarily lifted that he may use the bed-pan. The frame also permits the patient to be put on a carriage and get the benefit of being out in the sunshine.

IV. FRACTURE OF BOTH BONES OF THE FOREARM (FIGS. 3, 4 AND 5)

The case to be operated upon, Master J. M., sustained a fracture of both bones of the forearm two weeks ago. There had been two attempts at manipulation before the child came under my observation. When I saw him there was an unreduced deformity of both bones of the forearm. The fracture line was about one and one-half inches above the epiphyseal line. The displacement of the lower fragment was upward on the dorsum of the shaft and to the radial side.

I attempted under fluoroscopic control to reduce the deformity, but the attempt failed; there seemed to be an interposition of soft parts. Accordingly, I advised operation.

While I realize that operation near the epiphyseal line is not a desirable thing, there did not seem to be any way out because of the probable interposition of the soft parts.

It is extremely important that the deformity of the radius be reduced because of the fact that it is the right forearm of a child, and, unless the deformity is reduced and the relationship of the articular surface of the wrist restored, there will certainly be limitation of function of the wrist, and all are agreed that that is an undesirable result from the economic standpoint.

It is of importance to consider the type of operation to be done. Whether to

use metalic bodies, such as steel plates or beef-bone plates, or grafts, either intramedullary, sliding, or the on-lay graft, is a matter of individual opinion.

I have elected to use a steel plate for the following reasons: A graft of any kind would, of necessity, make a wound on one of the other extremities, and, I believe, would unduly prolong the operation. Since all that is necessary to have is reduction and temporary internal fixation, it seems to me that the use of a bone graft in this case is unnecessary surgery. I believe that the intramedullary type of graft should not be used. In order to be of service, this type of graft must fit snugly, and this certainly interferes with the function of the endosteum, upon which we depend so much for regeneration. All that we need is temporary fixation.

There are times when one is tempted, after the reduction is accomplished, to depend on the reduction without internal fixation. Within the year I did this and a little bit later on it was necessary for me to go back and apply a form of internal fixation.

The method of approach in these cases is of the utmost importance. The lower end of the radius should be approached in the intermuscular planes. Whether to use a tourniquet or not is a matter of individual opinion. In this case a tourniquet will not be used.

The line of incision which we are about to make is on the radial side of the forearm. The extensor longus pollicus was retracted to the dorsal aspect and the flexor carpo-radialis was retracted to the volar aspect. The radial nerve was then exposed and retracted. The fractured ends were then seen. The radius in the neighborhood of the fracture line was covered by a thin covering of recently formed soft callus, particularly on the proximal fragment. We found soft parts interposed between the fragments. The proximal fragment of the shaft was brought into the wound and held by a pair of lion-jaw forceps. While traction was made on the hand, the wrist was flexed and approximation of the two fragments obtained.

A Lane plate was applied, and only two screws were introduced as this seemed to be sufficient to immobilize the fragments.

The muscle planes were allowed to fall into place and the fascia was approximated with interrupted catgut, and the skin closed with interrupted dermol suture.

The ulna will not be operated upon at this time as I believe that any further manipulation might disturb the position of the radius. Further, it is important to remember that the ulna does not enter into the formation of the wrist joint, and, therefore, a complete reduction of this lower fragment is not as essential as the radial fragment.

The dressing to be applied consists of a molded plaster splint over stockinette.

Particular attention should be given to the application of the dressing. A great deal of harm may be done by anyone not directly responsible for the end result. If the operator will apply the stockinette himself and maintain the position while his assistants apply the molded splint, he will probably enjoy a much more comfortable rest, and certainly will not be able to blame anyone else if a deformity should result.

In this connection, the surgeon should make it his business to caution those who have to do with postoperative care not to give routine orders for sedatives when the patient complains of pain. Pain should be accepted as an indication that the bandage is too tight, or that the deformity has not been entirely

FIG. 6.
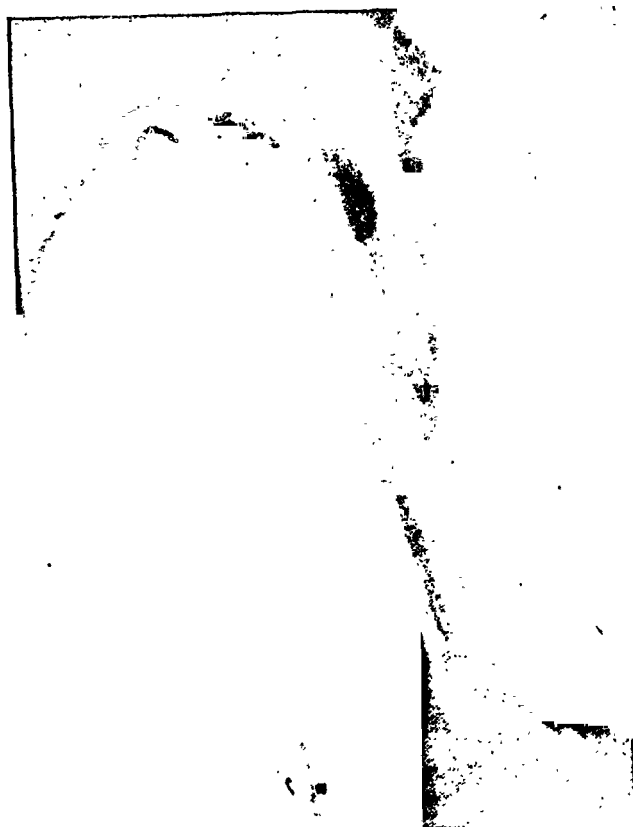
CASE V.—January 2, 1931. Mr. C. F. Fracture of humerus. After attempted reduction. Application of cast.

FIG. 7.

Case V.—January 9, 1931. Mr. C. F. Fracture of humerus. Application of Jones elbow extension splint.

FIG. 8.

Case V.—January 12, 1931. Mr. C. F. Fracture of humerus. After application of Pulham-Martin bands.

reduced. The surgeon should have investigated, before operative reduction, whether there is nerve injury or not. The finding of a nerve injury after the operation may be embarrassing to the surgeon if he has no notes relative to its absence or presence before the operation. There is a sense of satisfaction that comes from an anatomic exposure of the important structures that all of us should try to experience. In this connection I am reminded of one of my former professors, Dr. Edmond Souchon, who was in the habit of saying, "If you know where it is you will find it; if you do not know, you cannot guess," and this is particularly important when one is operating in the vicinity of important nerve structures. We should make every effort to follow the lead of our great teachers who have been essentially surgical anatomists.

The postoperative picture shows a complete reduction of the fracture of the radius with a Lane plate and two screws. There is still a slight displacement of the ulna.

Since the operation the patient has been comfortable.

February 2, 1931.—The wound has healed by primary intention. At present there is no deformity. The bony landmarks have been restored to their normal position. The radial head rotates with the shaft. The present evidence indicates that a good result may be expected.

V. FRACTURE OF THE HUMERUS (FIGS. 6, 7 AND 8)

Gentlemen, the case which we have before us is that of an oblique fracture of the shaft of the humerus in a patient seventy-two years of age. I have tried conservative measures in an effort to reduce the deformity, and I have failed. Under ordinary conditions, oblique fractures of the shaft of the humerous can often be treated by making use of indirect skeletal traction and the Jones elbow extension splint, or an abduction cast. These measures were used in this case and failed, as you will see by the X-ray pictures. While we were able to overcome the overriding, there still remained a lateral displacement. Fearing that this lateral displacement might lead to the interposition of soft parts, such as the musculospiral or radial nerve, with the consequent non-union and wrist drop, I advised operation. I might have applied Pierson pads in order to approximate the fragments and overcome in that way the lateral displacement. However, the danger of pressure on the radial nerve was considered, and I believe that any measure other than open reduction would have been dangerous to the patient.

I make these explanations because I have consistently advocated conservatism in the management of fractures. I believe that, in more instances than it is accomplished, reduction can be accomplished by the proper application of conservative non-operative means of treatment.

Having failed in our conservative measure, it is proposed to apply Parham-Martin bands and, if necessary, a beef-bone screw.

We owe a great debt to the late Doctor Parham and to Dr. Denegre Martin for this band. I believe that there are certain of these oblique fractures which do better with a Parham-Martin band than with anything that we have. It is true that the same thing may be accomplished with beef-bone screws placed obliquely through the two fragments, but in certain instances, if one of the fragments happens to be thin and is split by the use of the screw, there will be loss of tissue and the operation complicated.

Wherever there are two names associated with a particular instrument or operation, the question arises at times as to the relationship of the originator. In this particular instance I quote my friend, Doctor Martin. He has often said, in speaking of the bands, that Doctor Parham conceived the idea, and he delivered it.

The method of approach in such a case is of considerable importance. At all times, one should keep in mind the fundamental principles laid down by the late Dr. James E. Thompson, of Galveston. Might I remind you that he considered it absolutely essential that we operate as far as possible in intermuscular planes and avoid injury to important structures, particularly nerves.

In approaching oblique fractures of the shaft of the humerus, it is essential that one expose the radial nerve before anything else is done. If this is not done and injury results, the responsibility will be largely the surgeon's, and it is an avoidable responsibility.

The incision was made on the outer side of the arm from above the insertion of the deltoid to just above the external condyle. The radial nerve was exposed just above its penetration of the supinator muscle (brachio-radialis). The nerve was retracted, laterally and posterally. The biceps and brachio-radialis were retracted forward and the site of the fracture was exposed. The two ends of the shaft were approximated and held together with Lambotte clamps. Two Parham-Martin bands were applied about one and one-half inches apart. The shaft seemed so staple after the application of the two bands that I decided not to introduce the beef-bone screws.

The muscles were allowed to drop back, and the fascia approximated with interrupted catgut. The skin was closed with interlocking dermol sutures.

I did not introduce a drain because there was no bleeding and I felt that the introduction of a drain would mean that the wound would have to be dressed within twenty-four or forty-eight hours, thus increasing the danger of infection.

A molded plaster splint was applied, including the entire upper extremity from the middle third of the forearm, including a spica of the shoulder.

There are a few things in connection with this operative procedure which some may not entirely agree with. You probably observed that I did not employ the Lane technic because I have not been able to educate myself to the idea that sterile gloves, over educated fingers with tactile sense, are not more useful than sterile instruments. If we can sterilize gloves there should be no more danger from infection from the fingers than from the instruments. I have been able to educate my fingers, but I have never been able to educate my instruments. I know that that is a minority of opinion, but, nevertheless, I have seen no bad results from it.

I have not used a tourniquet because I felt that additional trauma to these vessels which are already markedly sclerotic might be dangerous. More than that, our idea in this case has been to avoid trauma. Trauma favors fat emboli and this certainly should not be overlooked because fat embolism is the most common cause of death following fractures.

I have not operated on a special fracture table because it might leave an impression with those who do not possess such a table that you cannot get along without it, and such is not the case.

The anesthetic sequence in both these cases operated this morning consisted in giving sodium amytal, three grains the night before the operation, and in the case of the patient seventy-two years of age, six grains of sodium amytal were

given one hour before operation. Morphia, grain 1/6, and atropine, grain 1/100, were also given before operation. Ethylene was administered in the operating room and before the patient left the operating room he was given 5 per cent. carbon dioxide in oxygen for five minutes. We believe that the use of carbon dioxide diminishes postoperative pulmonary complications.

A postoperative note might well be introduced here. Following the operation, the patient did not suffer pain sufficient to require morphine. As soon as he was able to answer questions, we investigated to see that there was no disturbance of the musclospiral nerve. The patient was able to move his wrist without difficulty in all directions.

February 3, 1931.—The wound has healed by primary intention. The arm moves as a whole. Present indications suggest a good result.

VI.   PITUITARY DYSFUNCTION—CHRONIC APPENDICITIS?

The next and last case to be presented in this clinic is included because we hear a great deal today about attempts being made to improve our standards in surgery. The important thing in such a case seems to be *when* to operate and not *how* to operate. Almost everybody seems to be convinced that he knows how to do an appendectomy. Whether this is a true state of affairs or not is best attested by the high mortality rate which still persists following operations on the appendix.

For many years, the ovary and tube rode the crest of the wave of enthusiasm on the part of the energetic operator. The crime against the human body, committed in the name of surgery on these organs, has been to a large extent eliminated. The appendix now occupies the center of the stage.

Because of the indiscriminate operating on this organ, the case of Master F. M. is mentioned for consideration.

The following is a brief history of the case.

Patient, F. M., aged sixteen years, was admitted from the Out-Patient Department with the diagnosis of appendicitis. The case is of interest because after a complete examination of this patient we had reason to believe that operation was not indicated, and was, therefore, not proceeded with.

It is true that this case, like many others with a right-sided abdominal pain, may without great danger have a simple appendix removed, but on the other hand such operations may well be classified, at times, as unnecessary. Examination of this patient revealed that he was markedly obese, the entire contour of his body conformed to the feminine type, there were large breasts, typical feminine pelvis, a lack of axillary hair, and the skin was moist.

The boy gave a history of doing very indifferent work at school, he had a very definitely perverted sense of right and wrong for which, at the time he came under our observation, he was confined to the Municipal Boys' Home.

Believing that we were dealing here with a pituitary dysfunction, an investigation was made. We found that his blood-picture showed 6 per cent. of the eosinophiles in the differential count, his basal metabolic rate was — 7 per cent. The X-ray pictures of his skull were taken and these showed no evidence of increased intracranial tension. The sella turcica was considered normal by the radiologist. The urinary findings were negative. Blood chemistry showed:

		Glucose tolerance	
Total non-protein nitrogen	24	Fasting	91
Urea Nitrogen	12	½ hr.	117
Creatinine	1.2	1 hr.	125
Uric acid	5	2 hrs.	86
Dextrose	91	3 hrs.	86

The eye grounds were examined by Dr. Henry Blum; there was no hemianopsia.

This case is of particular interest when reviewed in the light of the splendid work done by Rowe and Lawrence on Pituitary at the Evans Memorial Hospital in Boston. There are a few points in connection with their study which I believe are worth mentioning here. The blood-picture, in disturbed pituitary function, according to these observers, shows an upward tendency of the eosinophiles. I have seen 12 per cent. eosinophilia in the differential where there was no other cause for the eosinophilia than a pituitary disturbance.

Rowe and Lawrence consider that an "eosinophilia of a moderate degree coupled with an increase of uric acid of the blood is seemingly peculiar to pituitary disturbance."

One cannot help being impressed with their statement that "the pituitary is no more immune to disturbances of function than is the thyroid." They found, in a series of 1,000 cases examined in their clinic, that 65 per cent. had definite disturbances of metabolism of endocrine origin; 12 per cent. presented symptoms diagnostic of thyroid hypofunction, while 28.4 per cent. were classified as disturbed pituitary function. Distortion of the sella turcica, which is considered by so many of great significance for diagnosis of pituitary dysfunction, "was absent in all but 5 per cent." of their patients. They state "disturbance of its function (pituitary) may exist without affecting the sella outline and an abnormal sella turcica shadow does not prove that the pituitary is in any way involved."

In eye-ground examinations they found that in only 7 per cent. of their cases was there disturbance of vision.

In this boy's case there had already been one error made, and that was the error of confining this boy to an institution for delinquent individuals, thus bringing him directly in contact with criminals. He should have been treated as a mental defective on the basis of a disturbed endocrine system.

It did not seem wise to commit, in addition to this, the surgical error of operating, because I believed that the history of abdominal pain in this particular instance was not a trustworthy history, since the clinical findings did not bear out his statement.

COMMENTS ON SOME OF THE CHARACTERISTICS OF NODULAR LEPROSY

(With Illustrative Photographs)

Clinic of DRS. RALPH HOPKINS* and O. E. DENNEY†

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In a previous publication,[1] some photographs of the macular types of leprosy were shown. In this communication, the illustrations are photographs of the nodular type and were chosen to show certain characteristics of skin leprosy that aid in differentiating it clinically from other skin diseases.

The degree of certitude with which the diagnosis of nodular leprosy can be made clinically, and without the aid of the microscope, depends almost entirely on the extent to which the lesions have developed.

In the early cases, in which only a few discrete nodules are found (Figs. 1, 2, 22, 23 and 25), there is no characteristic of these lesions which can be regarded as pathognomonic of leprosy.

When, however, in the farther advanced and active stages, the tubercles have become numerous and have increased in size, becoming confluent in large infiltrated or tumor masses (Fig. 7, et seq.), the diagnosis can often be made with certitude merely on the characteristic appearance of the face. In the latter cases, so great is the disfigurement that the individual loses all resemblance to his former self and is more recognizable as a leper than as a person with individual facial characteristics (Figs. 15 to 18). The leonine expression ascribed to this type of leprosy is due to protuberances in those regions of the face where such elevations of the skin surface cause the facial contour to resemble that of a lion. The similarity in expression is accentuated by the marked way in which the normal folds and wrinkles of the face become increased in depth as the

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leprous lesions become elevated, while the symmetrical arrangement of these normal lines considerably augments the tendency which advanced leprosy has for bilateral and perfect symmetry (Fig. 14). Each nodule, as it grows laterally by peripheral extension, spreads in all directions until it has grown as far as one of the natural folds, where its further progress seems checked. As the lesions become confluent, the skin of the face is enormously thickened, except in the normal folds and wrinkles, which appear as deep linear depressions separating the almost perpendicular edges of the masses which cover most of the face. This type of case presents no difficulty in the clinical diagnosis.

Although, as was stated in a previous paragraph, there is nothing pathognomonic in the appearance of the early individual leprous nodule, yet it is sufficiently definite in its selection of areas of distribution to make the location of a lesion an important factor in the diagnosis. In a previous communication,[2] it was pointed out that certain anatomical regions were found to be exempt from leprous nodules in a survey of 300 lepers. In cases suspected of being leprosy in which the only evidence is a few nodules, the occurrence of these in one of the immune regions should, we think, be taken as evidence against a positive diagnosis. Because leprosy is polymorphous in its lesions and because an individual lesion may closely resemble that of one of many other skin diseases, some differential points in distribution are enumerated in the succeeding paragraphs. It should be borne in mind that even in the early cases presenting but few nodules, concomitant signs of leprosy are often present in the form of anesthesia, macular eruptions and commencing trophic disturbances in the extremities.

Eczema of the seborrhoic type may closely resemble leprosy when there is in the latter disease diffuse infiltration of the face without the formation of definite nodules (Fig. 9). The distribution, however, of the two diseases on the head is usually sufficient for differentiation. Seborrhoic eczema involves by predilection the scalp, spreads downward on the forehead, on the neck and behind the ears. On the face it occurs, by predilection, in the eyebrows, on the eyelids and at the wings of the nose. The entire external ear may be involved, and even the external auditory canal. In leprosy, the scalp is very rarely involved. Even when the forehead is distinctly

nodular and infiltrated the lesions rarely approach nearer than one-quarter of an inch from the scalp (Fig. 18). Indeed, the region of the forehead in which the seborrhoic process is apt to be most aggravated is, in leprosy, usually entirely free. Leprosy, like seborrhoic eczema, affects the eyebrows and eyelids, but in leprosy the lower lid is more apt to show lesions than the upper. On the upper lid, both diseases show a preference for the ciliary border. The sulcus of the upper eyelid in leprosy is often free even when there is extensive development of lesions on the ciliary border as well as on other parts of the face (Fig. 17). An equally extensive seborrhoic eczema of the face would be apt to involve the entire eyelid. The nasolabial fold commencing at the wings of the nose is free from lesions in leprosy. Again, in leprosy, the concha and parts of the ear internal to it are exempt. In types of eczema other than seborrhoic involving the face, if the eyelids are involved the distribution is apt to cover the entire eyelid, whereas, in leprosy, this is not the case.

Lichen planus does not have the same predilection for the face that leprosy has, but when lichenification occurs in a patch of leprous origin in some region other than the face, it is difficult to differentiate the two conditions (Fig. 20) except when, in the lichenoid patch of leprous origin, there are superimposed a few scattered nodules larger and more rounded than the small, flat-topped, angular, and closely aggregated papules of lichen (Fig. 24). The leprous nodules in the affected area are not unlike those often found in the macules of skin leprosy and the lichenification of the patch in which they occur should be regarded as would be a lichenification due to any other prolonged inflammatory process rather than as a characteristic of leprous lesions.

Psoriasis, like nodular leprosy, exhibits a predilection for the forehead, elbows and knees. But the involvement of the forehead is usually limited to its upper part near the margin of the scalp with extension of the lesions into the hairy region. In leprosy, on the contrary, the scalp is not involved and the leprous nodules and infiltrations even when fully developed on the forehead are not found near the hair line. That part of the forehead which is the favorite site of psoriasis is, indeed, exactly the part of this region which is most apt to be exempt in leprosy. On the elbows and knees (Figs. 20, 21, and 23), the distribution is not a differential point, as in the

case of the forehead, but in leprosy the development of lesions in these regions is usually late in the disease and the nodules and large tumor masses do not resemble the flat plaques of psoriasis.

Erythema nodosum, in the course, the character and even the subjective symptoms of its lesions, is practically identical with an acute occurrence of evanescent nodes in leprosy during periods of febrile reaction. In erythema nodosum, however, the nodes have a predilection for the lower extremities, while in leprosy the distribution is more general.

Erythematous lupus resembles the macules of the nerve type of leprosy more closely than it does the nodular, but is mentioned here because the atrophy, scarring and disfigurement caused by it may resemble the destruction remaining after leprous nodules have disappeared. The bat-wing distribution of erythematous lupus, however, is not at all characteristic of leprosy of either type, and the lines of the face do not limit the size of the patches as they do in nodular leprosy. Erythematous lupus may invade the scalp and the entire external ear, while leprosy usually spares the concha, even when the lobes and other parts external to the concha are enormously enlarged (Fig. 11). Ectropion may occur in anesthetic or mixed leprosy but is not a result of the nodular type; it is the result of degeneration and paralysis following nerve destruction, and is always associated with sensory disturbances. Lupus vulgaris may be differentiated from early leprosy by the tendency of the former to ulcerate and form scars. Early ulceration in leprosy is very unusual. In recent cases presenting but few lesions the distribution may be of no value, and when clinical differentiation is possible it depends more on the presence of the characteristics of the lupoid nodules than it does on anything distinctive in those of leprosy.

Granuloma annulare (Fig. 1) in its configuration resembles the circinate macules of nerve leprosy more than it does the nodules of the skin type and therefore definite evidences of anesthesia should be present to warrant a diagnosis of leprosy.

Syphilis in all its stages and types may present lesions closely resembling leprosy in one of its corresponding phases. The macular eruption (Fig. 26) associated with, or the precursor of, nodular leprosy may coincide in its distribution with the corresponding type of syphilis and exhibit no difference in the color or shape of the

Fig. 1.

Early macular lesion with depigmentation and commencing nodules arranged in arc of circle, resembling granuloma annulare or annular syphilide.

Fig. 2.

Early nodules not sufficiently characteristic for clinical diagnosis, resembling acnitis, sarcoid, lupus, etc.

Fig. 3.

Commencing "nasal rosette" resembling syphilis as much as leprosy. Nodules in ears and partial loss of eyebrows characteristic of leprosy.

Fig. 4.

Nodules large and small in characteristic distribution on forehead, cheeks, chin and ears. Partial loss of eyebrows. Early accentuation of the naso-labial fold in a child.

FIG. 5.

Discrete nodules on chin, cheek and ears. Mass of lesions in eyebrows characteristic of leprosy. Note overhanging eyebrows with loss of hair. Unusual ulceration and cicatrization, suggestive of granulomata other than leprosy.

FIG. 6.

Nodules appearing on an infiltrated base on forehead. Normal transverse and longitudinal lines of forehead commencing to be accentuated. Pendulous earlobes characteristic. Commencing "nasal rosettes."

FIG. 7.

Large, rounded, almost hemispherical nodules on chin. Elevated plaques both cheeks with distinctly marginated border ending abruptly, almost perpendicularly, at nasolabial folds. Ears and overhanging eyebrows characteristic. Commencing saddle nose. Accentuation of the transverse and longitudinal natural lines or wrinkles give impression of the fixed scowl characteristic of leontiasis. Characteristic symmetrical distribution of involvement.

FIG. 8.

"Nasal rosettes" showing superficial ulceration and cicatrization, not unlike tubercular syphilide. Annular lesion with elevated marginated border left side of chin also like tubercular syphilide. Ears characteristic. Large overhanging lepromata both upper eyelids.

FIG. 9.
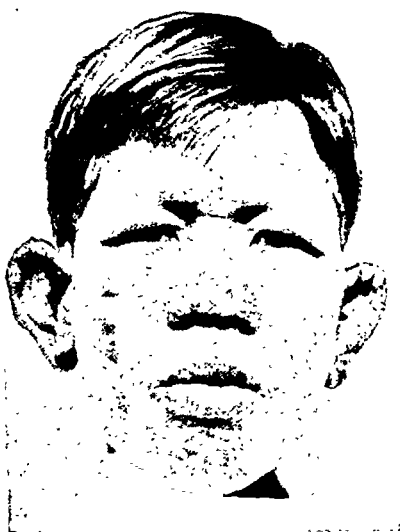
FIG. 10.

Diffuse infiltration of entire face which has obliterated the normal lines of expression instead of accentuating them as does the presence of nodules. Folds dependent from supraorbital region hanging over and concealing both upper eyelids. When these folds are lifted the upper eyelids are disclosed and appear relatively normal. Complete loss of eyebrows and eyelashes. Ears characteristic. Except for nose and ears the infiltration of the skin resembles that of a chronic eczema.

Unusually extensive involvement of helix of left ear. Accentuated naso-labial fold. Well-developed "nasal rosette." Upper eyelids hidden by overhanging folds. Well-marked saddle nose. Complete loss of eyelashes and eyebrows. Upper lip characteristic of advancing leprosy. Vermilion border of lower but not of upper lip involved.

FIG. 11.

Closely aggregated but discrete nodules on chin. Larger nodules characteristically located on eyebrows. Symmetry in distribution of lesions on hands as well as face.

FIG. 12.

Example of the tendency to symmetry in distribution in a case in which the nodules have not yet developed sufficiently in size to show accentuation of the normal folds of the skin. The "nasal rosette," the row of nodules above and below the vermilion border of the lips, as well as the nodules on chin and ears, characteristic of leprosy. Circinate papular syphilide-like lesion between nose and lip.

FIG. 13.

Lesions similar to FIG. 12 but more extensively distributed on face. With the greater area involved the naso-labial and other folds appear exaggerated in depth.

FIG. 14

Striking example of how the tendency of leprosy to be symmetrical is augmented by the accentuation of the normal lines of the face. Note how the contour of the infiltrated masses on the cheeks is determined by the naso-labial and other folds.

FIG. 15.

Typical facies of terminal nodular leprosy; obliteration of natural facial characteristics resulting in "mask-like," almost fixed expression suggesting a composite picture of leprosy rather than that of an individual (see FIGS. 16 and 17). The scar on the nose resulted from an epithelioma treated with X-rays. Zone of relatively normal skin one-fourth to one-half inch wide extending along the scalp line.

Fig. 16.

For comparison with Figs. 15 and 17. Note the resemblance between the faces of three individuals of different races. Note the superficial character of the ulceration on the nose.

Fig. 17.

For comparison with Figs. 15 and 16. Resemblance to acne rosacea in lower part of nose more marked than in Figs. 15 and 16.


Fig. 18.

Highly developed individual nodules without diffuse infiltration of skin. Abrupt margination at naso-labial fold of all nodules bordering on this groove. Characteristic symmetrical distribution. Between the scalp line and the mass of lesions covering almost the entire forehead can be seen the characteristic narrow band of normal skin.

Fig. 19.

Late stage of nodular leprosy with diffuse infiltration of entire face. Extensive and superficial ulceration. Crusts with underlying pus in large quantities.

Fig. 20.
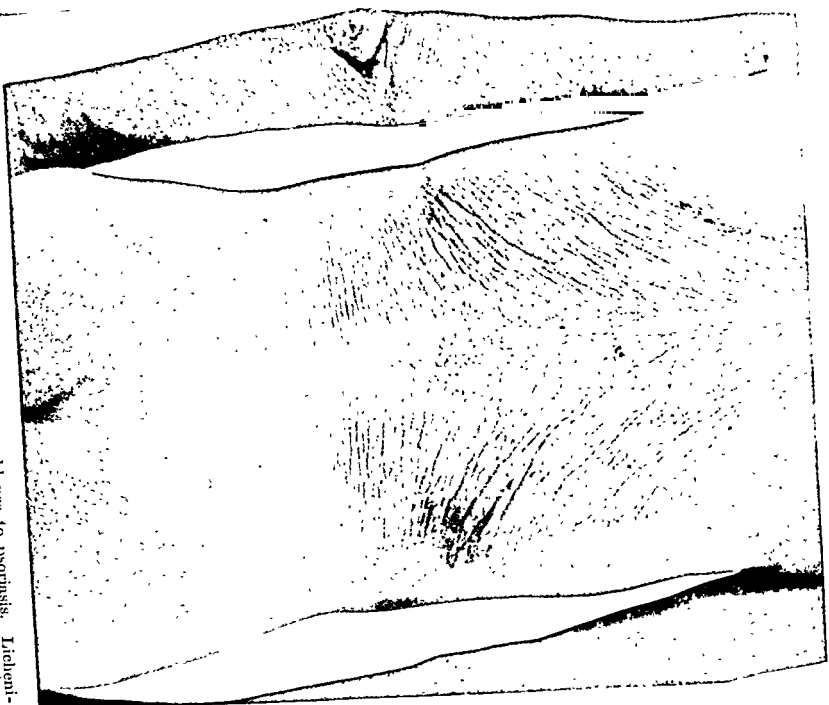
Nodular masses on tips elbows with some resemblance to psoriasis. Licheni-fication in a wide area above buttock. Marked wrinkling of skin in dorsal region. All of leprous origin.

Fig. 21.
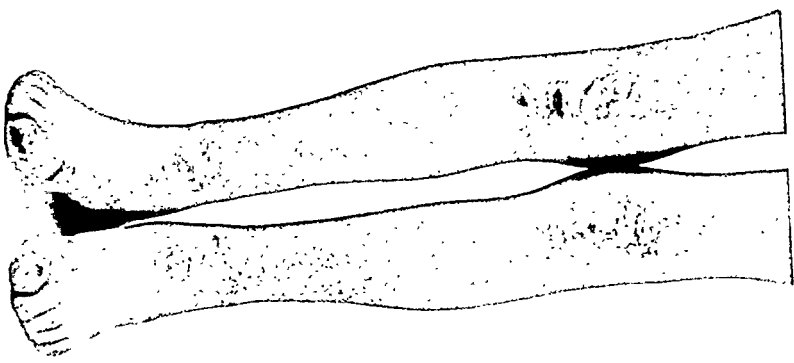
Location of leprous lesions on knees suggestive of psoriasis. Superficial ulceration of feet characteristic of nodular leprosy. Toes suggestive of dermatophytosis though typically leprous.
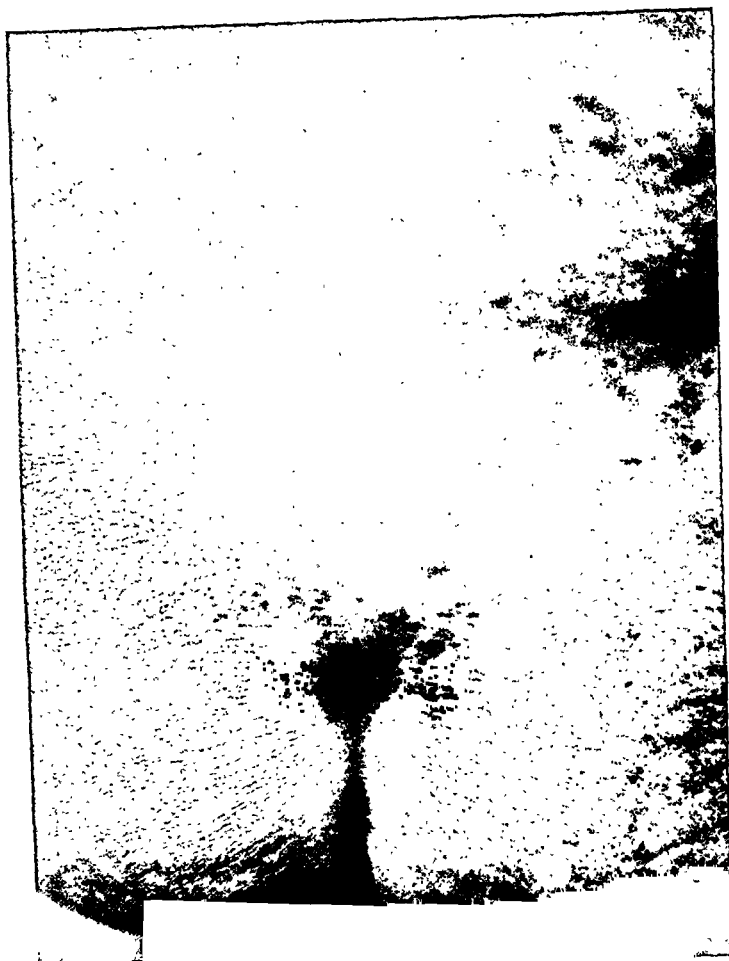
FIG. 22.

Leprous nodules. Resembling granulomata of other diseases as much as those of leprosy.

FIG. 23.

Psoriasis-like leprous nodules on extensor surface of arm. Note classic distribution on tip of elbow.

FIG. 24.

Lichenification of leprous infiltrated patches in gluteal region extending upward. Discrete, typically leprous nodules, scattered in the infiltrated patches. Note pale area of relative immunity over sacrum and spine.

FIG. 25.

Early leprous nodules, some undergoing involution showing atrophy and pigmentation not the result of necrosis or ulceration. Resemblance in nodules still active to tuberculides and other granulomata.

Fig. 26

Macules of skin leprosy closely simulating macular syphilis. Note the uniformly small size of lesions which is more characteristic of syphilis than of leprosy. In regions of the body not shown in the photograph, larger macules are present.

lesions. In both conditions, scales are usually absent, and there is nothing pathognomonically characteristic in the appearance of each individual lesion considered alone. In syphilis, however, the macules are relatively uniform in size and not apt to be larger than a finger-nail, whereas, in leprosy, the size may vary from that of a finger-nail to that of an entire anatomical area. Cases of leprosy in which all of the macules remain the size of those of syphilis are unusual. Among the small macules scattered on the trunk there may generally be found one or more as large as a silver dollar or even larger.

The papular syphilides as individual lesions may resemble the corresponding lesions of very early leprosy, but the much wider distribution and far greater number of lesions found in syphilis make the differentiation easy. As leprosy advances, the size of the lesions easily excludes papular syphilis.

The tubercular syphilides are more apt than are the nodules of leprosy (Fig. 3) to have a serpigenous arrangement, and, like the other late lesions of syphilis, are far more apt to be unilateral or asymmetrical, and have a greater tendency to ulcerate than the corresponding nodules of leprosy. Moreover, ulceration in syphilis is usually much deeper than the ulceration occurring in the nodules of leprosy, which rarely break down (Fig. 16) like a gumma or a tubercular syphilide. The destruction of skin over leprous nodules or tumors is more of a superficial erosion than actual ulceration and occurs late in the disease with a process commencing in the thinned outer layers of the skin rather than in a necrotic process commencing in the depth of the lesion (Fig. 19). Ulcers of the leg, however, are generally associated with neurotrophic disturbances and in consequence involve deep tissues. Such ulcers occurring late in the nerve, or mixed type of the disease, are practically indistinguishable from those of syphilis. The perforating ulcer, with its sinus leading to necrotic bone, occurring most frequently on the soles or palms and of trophic origin, is always associated with anesthesia. The location of a gumma in these regions would be unusual and there would be no impairment of sensation. In some Eastern countries the location of a perforating ulcer on the sole is regarded by the laity as pathognomonic of leprosy.

In general, it may be said that the differential diagnosis between the early, small, individual nodules of leprosy and those of other

diseases presenting similar lesions depends less on any characteristic found in the leprous nodule than it does on evidence which points to a positive diagnosis of one of the diseases other than leprosy. There is usually but little change from month to month in early leprous nodules. Necrosis or ulceration with scar formation is very unusual. The lesions do not become pustular nor do miliary abscesses occur. They are not pearly in appearance or verrucose, and scales and crusts are almost always absent. The presence of some of these characteristics is evidence more or less strong against the diagnosis of leprosy, while it may be diagnostic of acnitis, tuberculides, acne rosacea, epithelioma, molluscum contagiosum, or destructive fungal infections like blastomycosis.

In the preceding paragraphs, consideration has been given to the physical characteristics of nodular leprosy. It is emphasized that confirmation of the diagnosis by bacterioscopic examination is essential, particularly so in view of the readiness with which the *mycobacterium leprae* is demonstrated in all nodular lesions.

SUMMARY

Photographs are shown of twenty-six bacterioscopically proven cases of skin leprosy in different stages of the disease. Fifteen of these photographs are of lesions closely resembling those of diseases other than leprosy.

Attention is called to the absence of pathognomonic characteristics in the individual nodule of early leprosy.

The facies of advanced and easily recognizable leprosy is described with particular reference to the importance of the normal folds of the skin in determining the so-called "leonine" and characteristic expression.

Points of differentiation between nodular leprosy and some diseases resembling it are enumerated with particular reference to the importance of the distribution of the lesions.

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Diagnosis and Treatment

ON THE USE, MEANING, AND SIGNIFICANCE OF THE TERMS "SARCOMA" AND "CARCINOMA"

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THE use, meaning, and significance of the terms "sarcoma" and "carcinoma" have in the course of time undergone changes and only recently been the source of discussion. A consideration of the varying understandings of these terms, their disagreements and the modern views on their employment seem for practical reasons well suited for a summary presentation before wider circles. It is not necessary to preface this consideration by a long, detailed, historical account, for although this is in itself interesting and instructive enough, it is a matter which is easily consulted in some of the well-known works on tumors. I may refer here only to Wolff's "History of Cancer Research" and Virchow's "Cellular Pathology" and "Lectures on Tumours."

It is perhaps sufficient for this purpose to state that both terms were based originally on the gross appearances and external characteristics such as color, localization, vascularization, consistency and manner of growth. The term cancer or carcinoma is the older and more commonly employed term while sarcoma, although occasionally used in older medical literature in a more restricted sense, as by Galen in the description of abnormal fleshy growths in the nares and as synonymous with polyp, and subsequently by some surgeons in the sense of fleshy and highly vascularized growths, did not acquire greater prominence until the early nineteenth century. A more exact definition and differentiation between cancer and sarcoma were, of course, not possible until the cellular and tissue concepts became clearly established.

The definition of sarcoma which is still perhaps the prevalent one is that originally laid down by Virchow in the "Cellular Pathology" and later more extensively in his classic tumor work: "an abnormal

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growth which belongs to the general group of the connective tissues and which is distinct from other tumours of the same species only by the predominant development of cellular elements." Based on this consideration, a larger number of subdivisions was thus recognized depending upon cell and fibrillar contents. The definition of cancer, on the other hand, as "an atypical epithelial growth of either surface or internal lining cells" was not agreed upon until after almost endless discussion and confusion, principally through the work of Thiersch and Waldeyer, who established its epithelial character and thus histogenetically as well as embryogenetically strictly separated both groups of tumors. This classification and separation, which soon enjoyed general recognition for a longer period, rested on the idea of a strict separation of the primitive embryonic layers of the blastoderm with a corresponding definite fixation of later tissue types, that is, in "epithelium" and "connective tissue." Thus Virchow's doctrine of "omnis cellula e cellula" was enlarged to "omnis cellula e cellula ejusdem generis." Only very narrow limits of metaplasia were thus considered possible.

The first break with this restriction and significance of these terms came with the expansion of the term sarcoma to other types of predominatingly cellular, histoid tumors, so that not only those of the connective-tissue group but of others were included. Where such an indication was definite, the derivation by a special prefix or suffix was added; thus arose terms like myosarcoma or sarcoma myomatosum, gliosarcoma or sarcoma gliomatosum, *etc.* Thus the term sarcoma was widened to include cellular tumors of tissue groups of different embryogenetic derivation. Billroth, it is interesting to record, insisted upon this expansion of the term principally for the perfectly good reason that at certain stages of embryonic development the appearance of most of these tissues (especially in muscle and nerve) is so much alike that the histogenesis of corresponding tumors cannot be accurately determined, so that, for example, the term "spindle-celled sarcoma" is applicable to all diffuse tumors of spindle-shaped contents no matter what their histogenesis. Most investigators followed suit and the term sarcoma thus lost its exclusive histogenetic significance, and was, in contradistinction to carcinoma, reserved for diffusely growing, undifferentiated cellular tumors without characteristic stroma or arrangement. For cancers the epithelial

derivation and alveolar arrangement by a coördinated stroma was retained.

Soon, however, greater, more deeply seated and confusing difficulties made themselves felt. One of the first was the hotly disputed problem and position of the endotheliomata, which shook the whole sharp distinction between mesodermal and epithelial (ectodermal) derivatives. It reopened the long discussion of heteroplasia—that is, the possibility of the formation of cancer cells from other than epithelial tissues, as originally held by Virchow. More serious and effective was the result of coincident embryological investigation by O. and R. Hertwig (1881, 1886) which indicated that the three layers of the blastoderm were not all original and distinct, but that the middle layer (mesoderm) arises later and principally from the entoderm. Later researches by others added also the ectoderm as parent layer for the mesodern. Consequently the absolute specificity and immutability of ectoderm, mesoderm and entoderm were lost and thus also the embryogenetic specificity of tissues. Thus the struggle whether endothelial cells (mesodermal in origin) may transform themselves into cancer cells (epithelial in origin) lost its significance, for the term epithelium or endothelium for certain surface linings became a matter of choice of individual investigators, while some even adopted terms like angioepithelium, to designate the lining cells of blood-vessels. Even the histological distinctions between mesodermal and ectodermal tissues became thus blurred, viz., glia being made up of "fibrillar cells," while the interstitial testicular cells are "epithelioid," a fact which is also noted in connective-tissue cells on surfaces in what is termed "pseudometaplasia" or histological accommodation.

For tumor classification this changing attitude became of fundamental importance, but also the source of greater confusion. What then was to be regarded as sarcomatous, what as carcinomatous? Thus Minot expressed his embryological conviction some years ago by the statement that it was just as correct to speak of a "gliosarcoma" as to speak of a whale as a fish. Add to this that endothelial tumors of the pericardium, pleura and peritoneum grow like epithelial alveolar cancers, while the endotheliomata of blood- and lymph-vessels grow perivascular, diffuse cellular, like the sarcomata; that neuroepithelial tumors grow glandular alveolar, and gliomata,

of the same genesis, cellular and diffuse; that, again, mesodermal glandular organs like the kidneys, suprarenal cortex, uterus, and sex glands produce tumors which grow either in typical epithelial cancerous manner, or, especially in their metastasis, in sarcomatous fashion, and that tumors from organs like the thymus, certain cancers of the lung and stomach, and others, may grow entirely in the form of small-celled, diffuse "sarcomata" (See Figs. 1 and 2); that the melanomata which are of as yet obscure embryogenesis and histogenesis may grow, even in one tumor, partly alveolar carcinomatous, partly diffuse sarcomatous; and, finally, that in artificial tumor transplantations changes from cancers to sarcomata have been described, indicating variations of manner of growth in one and the same type of tumor. When it is further considered that some tumors classified under the sarcomata may imitate alveolar growth, as, for example, the so-called "alveolar sarcomata" of bones and muscles, the confusion as regards significance of the terms sarcoma and carcinoma is complete.

While these difficulties are of more general order, there are certain others, more individual in character, which may at times mislead. Squamous epithelial tumors of surfaces (especially the so-called "basal cell" cancer) may sometimes grow in diffuse spindle-celled manner with fibrillar endings, a fact which has led to disputes as regards histogenesis of some of these tumors. Beitzke mentions a case of an undoubted epidermoid tumor of the tongue (cancroid) in which the most peripheral cancer cells split into fine fibers which, without transitions, connected directly to stroma fibers, and I have seen several cases of so-called myosarcomata of the bladder in which, curiously enough, the separation from diffuse, large-celled bladder cancers was difficult and remained uncertain. Herzog also mentions in an "apparent" sarcocarcinoma of the esophagus a definite transition of small "sarcoma similar" cells into large keratinizing epithelial cells!

It would be an error to infer that these are exceptional curiosities. Every pathologic anatomist knows the difficulties and arbitrary classifications which thus confront him daily. Therefore, as knowledge in tumors increased it has become correspondingly difficult to adhere either genetically or histologically to strict distinctions and differentiations between the terms sarcoma and carcinoma. In fact, there is a larger borderline firmly established, in which any attempt at

FIG. 1.
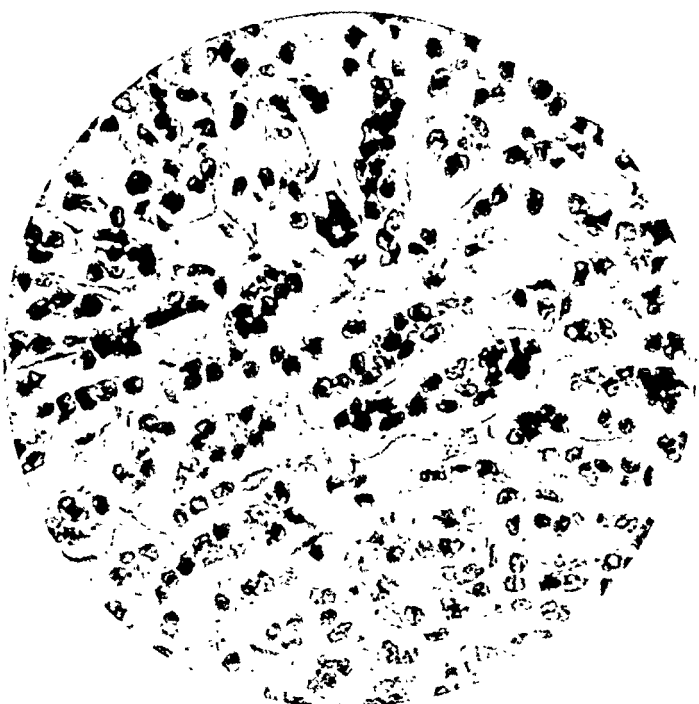
From a "cancer" of the breast. The growth shows in this field a charac-
teristic alveolar, duct-like (tubular) arrangement of fairly uniform "epithelial"
(lining) cells.

FIG. 2.
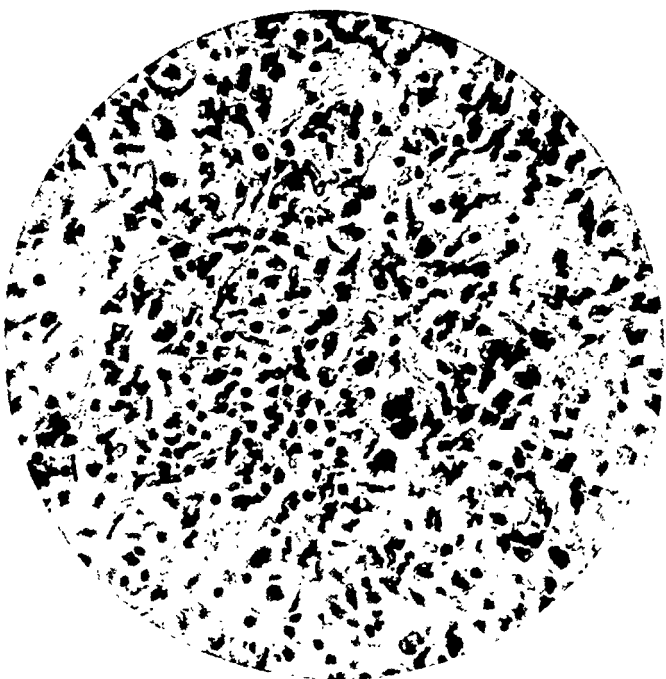
From another field of the same growth as Fig. 1. This field shows a diffuse,
"sarcomatous" character of indefinite, polymorphous cells lying in a delicate
intercellular reticulated structure.

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accurate distinction is quite impossible and in which the terms sarcoma and carcinoma are purely a matter of arbitrary diagnosis.

What has been said so far applies to microscopic distinctions, but even the grosser, external characters of these tumors, their relation to blood-vessels, their manner of metastasis by blood- or lymph-stream have been found so variable and contrary to the older, stricter conceptions that even this evidence has lost much of its value as a helpful guide in their diagnosis. A larger number of cancers may grow in a more perivascular fashion with a tendency to break into blood-vessels and metastasize by the blood-stream, just as it at one time was considered almost exclusively characteristic of sarcomata. On the other hand, even mesodermal (sarcomatous) tumors may occasionally produce, or grow with, considerable stroma and break into and spread by lymphatic extensions.

In view of all these difficulties much thought and work has been devoted to avoid a complete shipwreck in this terminology and to still preserve the division of sarcomata as connective-tissue or histoid tumors, and carcinomata as epithelial or surface-cell tumors. One of the earliest attempts was to establish differences in the relationship of cells to stroma and to accompanying fibers or fibrils. Thus it was stated that the relation of sarcoma cells to them is more direct, intimate, parenchymatous, while that of cancer cells remains indirect, independent of the cells composing the cancerous parenchyma. This distinction is not always definitely or convincingly established even in typical growths, especially in invading tumors, when splitting by, and incorporation of older tissue fibers into, the advancing growth occurs. Thus it may fail to distinguish either diffuse, small-celled cancerous tumors, or large-celled "epithelioid" types of sarcomata. A great deal of attention has subsequently been devoted to the demonstration of finer cellular and intercellular fibrils as means of distinction. Thus it has been, and still is, held characteristic of sarcomata that they exhibit an extremely fine pericellular reticulated network (Gitterfasern) and that this inner, additional fibrillar network even separates the "alveolar sarcomata" from the ordinary alveolar cancers in which it is lacking. Such pictures may indeed be occasionally demonstrated and, in connection with certain other considerations, and aided by specific stains (as the Bielschowsky method of silver impregnation), prove of some value but it is, I think, now acknowledged by most experienced pathologists that even

this finer method may fail as a standard of classification, or remains of doubtful order. For here also the difficulties of exact interpretation as to the derivation of fibrils, their relation to the tumors and to tumor cells and to older, splitting fibers, are not always sufficiently clear.* At the best such aids remain "analogies" rather than genuine criteria.

These questions have lately received a commendable study in the extensive comparative investigations of E. Mayer and M. Cohn, who come to similar conclusions. Thus also, Borst in a recent discussion of this question, states, "There exist very indifferent, diffusely infiltrating cancers, which exhibit exquisite sarcomatous character and which, therefore, make a histogenetic distinction between these two tumour types impossible." In this opinion other well-recognized investigators concur. Moreover, in tumors of organs or tissues of as yet uncleared embryogenesis and histogenesis, such as the thymus, we are quite at a loss whether to speak of sarcoma or carcinoma. Similar considerations apply to the pigment-celled tumors. They have been designated as "thymomata" (Schridde, Kaufmann) and "melanocytoblastoma" (Lubarsch) respectively—monstrous terms which, however, possess the advantage of being noncommittal one way or the other.

Many of these and other difficulties of tumor diagnosis may be traced, in my opinion, to an as yet almost unexplored field of oncology—the relationship of tumor cells to their environment. For the sum total of our present formal knowledge of tumors points to this indication: that the manner of tumor growth is not only an inherent phase of the tumor character, but also an expression of its relations to the tissues of the host! Ricker has touched upon this problem in his comment that the structure of a tumor is determined by its metabolism and its effect upon tumor environment, not by its derivation. In this instance that would mean that the diffuse sarcomatous manner of certain cancers occurs when, in the absence of certain metabolic, secretory cell products, no formative stroma stimulation occurs, but that in the presence of such secretions stroma is irritated to greater or lesser production. It lies outside of the sphere of this communication to enter into these details, but they are suggestive.

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* It need hardly be emphasized how much the results of such procedure depend upon proper or improper fixations!

The present tendency of pathologists has therefore been to relinquish any fixed idea with regard to even the diagnostic significance of sarcoma and carcinoma as far as derivation and histogenesis are concerned but to use both terms if they are to be retained purely in a descriptive morphologic sense as indicating the *manner* of growth. Only recently B. Fischer stated in a discussion that if we should ask a normal histologist to classify all body tissues into epithelium and connective tissue we would meet an entire lack of comprehension on his part. Just as senseless, he argues, is the classification into sarcomata and carcinomata as divisions for all kinds of undifferentiated cells which grow as tumors. It is solely the lack of insight into the finer movements and phases of embryonic differentiation which prevents us from recognizing them in all cases. Thus, also, the conception of epithelium remains meaningless unless qualified by kind and developmental stage. Every insight into tumor problems must be based on a profounder knowledge of the laws of differentiation. Fischer thus rejects even for diagnostic purposes the terms sarcoma and carcinoma.

On the other hand, other pathologists make a clear distinction between the requirements of diagnosis and of scientific findings and conclusions (M. Cohn and others). However that may be, I think the majority agree that at present the uses of these terms and further attempts to substantiate them by accessory morphologic distinctions are not inducive to either much better or more exact diagnosis or to scientific understanding, and no one who has any original knowledge in these regards will fail to note the arbitrariness with which these terms are juggled which in many cases even reaches the weakness of pious beliefs. Strictly speaking, from the scientific standpoint of pathology or even from that of the clinic, the distinction between sarcoma and carcinoma has lost its essential significance. Even from the practical side their diagnostic and prognostic value as regards histogenesis or nature and behavior of the tumor, which include manner and rapidity of growth, possibilities of recurrence, distribution and rapidity of metastatic deposits, has reached a stage in which revision of the old, still standardized ideas is urgently needed. Recent attempts to subdivide and reclassify under these old names are quite futile and, as in some recent schemes of classification of bone tumors, really grotesque, and a play with words. If it is decided to retain these terms for the present in want of something better,

then it may only be done in the widest sense of descriptive terms as regards manner of growth. This is at present done for clinical purposes in my Institute.

There is still too much significance attached on the clinical side to the words carcinoma and sarcoma. Pathologists themselves, unfortunately, for practical reasons of reports, have been altogether too free and encouraging with the use of these terms. A diagnostic venture in an unknown subject such as that of tumors always contains · elements of danger and should be as noncommittal as possible. Definitions with an appearance of studious details are to be avoided. Such ridiculous terms as "benign carcinoma or sarcoma" are beneath criticism! The history of the meaning and significance of the terms sarcoma and carcinoma is only another illustration of traditional obstacles which confront a forward-moving science and augmented by an endeavor to combine scientific understanding with practical requirements. Strict classifications which are only too apt to become fossilized mislead if they are taken as an indicator of the nature of things. To many clinicians the terms sarcoma and carcinoma unfortunately still retain something real. The sooner they dismiss this now antiquated attitude, the better for the advance even of clinical knowledge, for out of this uncertainty clinical investigation would greatly profit by renewed unbiased observations into the life history of the undifferentiated forms of tumor growth. (Figs. 1 and 2.)

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OSLER'S "TELANGIECTASIS CIRCUMSCRIPTA UNIVERSALIS" AND URTICARIA PIGMENTOSA OF ADULTS

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ON JANUARY 21st, 1906, Sir William Osler, while taking a ward class in the Johns Hopkins Hospital, came across a form of generalized telangiectasis which, though always interested in the subject of telangiectases and small angiomatous naevi, he had never met with previously. The patient (W.J.H.) was a man, aged thirty-nine years, whose skin presented a very remarkable appearance. Large portions of his trunk and extremities were scattered more or less closely with dark-red spots, varying from 2 to 6 millimeteres in diameter. The spots were thickly set over the chest and back and on the flexor surfaces of the forearms and inner aspects of the arms (see the figures that illustrated Osler's paper.[1] Under pressure they disappeared, leaving only a slight brownish tinge; they were, therefore, not purpuric, but telangiectatic, although by simple inspection no individual blood-vessels could be distinguished. Their ordinarily dark purplish color could be changed to a vivid red by rubbing, and they were not raised above the general level of the skin. Factitious urticaria could be readily produced. The spots were of ten years' duration and therefore could be called permanent. During that time, though they had never disappeared, they had been less intense in color during summer than during winter. The hands and feet in Osler's case had a cyanotic purplish appearance. The patient had also suffered from hemorrhoids, nervous prostration, epistaxis (first in November 1905), recent attacks of abdominal colicky pain of some kind, and hematuria. (Figs. 1 and 2.)

The above abstract is, I think, sufficient to show that the extraordinary permanent telangiectatic macules in this patient, described by Osler under the heading "Telangiectasis Circumscripta Universalis"[1] was similar to the cutaneous condition quite recently described by Doctor Hellenschmied and myself in the *British Journal of Dermatology and Syphilis*,[2] without recognizing that it was the same as that described in 1907 by Osler. It was only after Octo-

ber 16, 1930, when I showed our case at the Dermatological Section of the Royal Society of Medicine under the heading, "Telangiectasia Macularis Eruptiva Perstans, Probably a Telangiectatic Variety of Urticaria Pigmentosa in an Adult"—that I recognized the similarity of the red macular condition of the skin to that previously recorded by Osler. (Fig. 3.)

Following is a short description of our case:

Mrs. F. N., aged sixty years, a somewhat obese woman, has since the age of forty years, or earlier, developed a most striking condition of generalized cutaneous macular telangiectasia, which is no longer increasing. The persistent red macules, varying from 2 to 6 millimetres in diameter, are mostly not elevated, though a few project very slightly above the general level of the skin. The red color disappears completely under diascopic pressure (the macules are, therefore, not purpuric), but in some of them slight brownish pigmentation is left. The spots are distributed chiefly over the upper part of the front of the thorax, the outer surfaces of the upper limbs and the abdomen (see figures). They are, therefore, by no means confined to exposed surfaces, and that speaks against a traumatic element in the etiology. The face is free from the macules, though it presents many linear or arborescent telangiectases of the ordinary kind. There are no purpuric lesions anywhere. There is no evidence in favor of a neuropathic etiology.

Somewhat similar cases have been recorded in France by E. Vidal[3] and others, to which references were made both by Osler and in my paper with Hellenschmied. Vidal's and other older cases from the literature were abstracted by T. Colcott Fox[4] to form his second telangiectatic group, namely, "essential telangiectases in plaques." Vidal's case was that of a neuropathic woman, aged thirty-one years, who suffered from urticaria at the onset of menstruation (when she was aged thirteen and one-half years). Soon afterwards (when aged fourteen years) permanent red macules began to appear on the inside of the forearms and then gradually extended to the breast, neck, wrist, backs of hands, the lumbar and dorsal regions, belly, internal aspect of thighs, and soles of feet. The lesions were lenticular, hardly raised, and on the forearms confluent. She suffered from pruritus and was dermographic and at times of menstruation she sometimes had a little epistaxis.

Other cases abstracted by Colcott Fox (mostly from French literature) were those of L. Brocq (1894), L. Lévi and L. Delherm (1901), L. Lévi and Lenoble (1896), P. A. Morrow (1894), Lanceplaine (1904), and Morny and Malloizel (1905). L. Lévi and

Fig. 1.

Factitious urticaria in Osler's case of telangiectasis circumscripta. (Reproduced with the permission of the Johns Hopkins Press of Baltimore.)

Fig. 2.
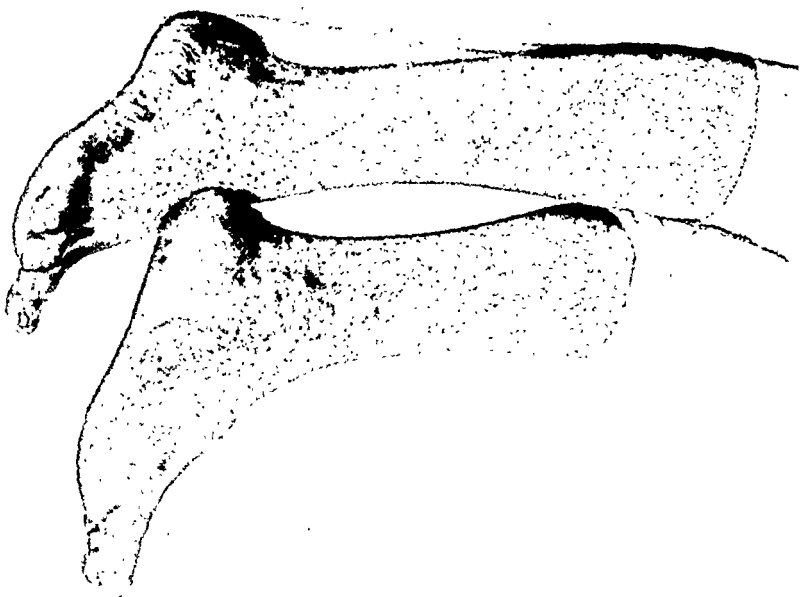
Appearance of legs and feet in Osler's patient with telangiectasis circumscripta universalis. (Reproduced with the permission of the Johns Hopkins Press, Baltimore.)

Fig. 3.

Photographic reproductions from various parts of the body of Dr. F. Parkes Weber's patient with telangiectasis circumscripta universalis.

others spoke of "télangiectasies acquises généralisées." L. Brocq, writing later of "télangiectasies essentielles en plaques acquises,"[5] states that the lesions may commence at any age; the earliest are usually in the upper or lower limbs, but they may become closely scattered all over the trunk; the face is rarely affected. The individual lesions may vary in size from a pin's head to a franc, and their surface may be slightly powdery or atrophic. The past history, he says, varies much in different cases.

Though minor examples of macular telangiectasia of this kind may in reality not be so uncommon, examples like the above mentioned ones must be of extreme rarity. Osler was fifty-eight years old before he met with one, and I was sixty-seven before I came across the one described with Doctor Hellenschmied, though amongst other opportunities for seeing rare disease, I have regularly attended the meetings of the Dermatological Section of the Royal Society of Medicine and its predecessor, the old London Dermatological Society, since 1897.

By comparing the case of Mrs. F. N. with a typical one of urticaria pigmentosa of adults, I have come to the conclusion that macular telangiectasia of this type is allied to—that is to say, is a very rare telangiectatic, relatively pigmentless, variety of—urticaria pigmentosa in adults. The presence of brownish pigmentation in some of the lesions is quite unmistakable, with or even without diascopic pressure; the lesions become redder and some of them become definitely elevated on rubbing them (or more definitely elevated, if already very slightly elevated before rubbing them), though this is not associated with any itching. Moreover, as stated above, slight factitious urticaria can be produced over the back of the thorax. I believe that a case of this kind has never previously been regarded as a variety of urticaria pigmentosa. Such a diagnosis was not suggested by Colcott Fox in 1908, when he quoted many cases of the kind,[4] but E. Besnier, in the discussion on Vidal's case (quoted above)[3] seems to have thought that that case might be related to urticaria.

The ordinary types of urticaria pigmentosa in adults are not of course quite so rare, although till quite recently hardly mentioned in text-books. Lately about three excellent examples were shown at a single meeting (October 16, 1930) of the Dermatological Sec-

tion of the Royal Society of Medicine. At a meeting of the old London Dermatological Society in 1892, a typical case was being discussed when I showed a case of another kind for Sir Dyce Duckworth, whose house-physician I was then. At that time no adult with urticaria pigmentosa could escape without being suspected of having syphilis and without being subjected to prolonged or repeated antisyphilitic treatment.

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EYE INFECTIONS OF DENTAL ORIGIN*

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EVERYONE is aware that there is an urgent question before us at the present day as to the relations which exist between affections of the eyes and diseases of the teeth, though not everyone is familiar with the fact that this question is not of recent date but has been under discussion in medicine for a very long time. Hippocrates, the great Greek father of medicine, who has touched nearly everything in any way relating to the medical sciences, made the remark nearly 2,500 years ago that dental affections can influence distant organs. The term "eye teeth," which is the popular name for the canines, is one testimony to the fact that certain clinical observations were made in this domain long ago, for otherwise that term would not have secured a definite place in the language as a record of the medical as well as the popular persuasion that there was very · direct pathologic connection in certain cases between the teeth and the eye.

Already as early as 1728 Fauchard, the distinguished French oral surgeon, who is looked upon very properly as the father of modern dentistry, made certain observations with regard to the etiologic relations which exist between dental diseases and certain systemic affections. Fauchard's observations have always proved to have very definite truth behind them, though his conclusions were lost sight of to a considerable extent until our own generation. In this same order of ideas, a well-known French surgeon called attention, in 1840, to the importance which the teeth have in connection with surgical intervention and how important it is to get them into as good condition as possible. I should call attention also to the fact that more than twenty-five years ago Doctor Dorese was very much interested in reports which had been issued with regard to the relations which had been demonstrated to exist between eye and

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* A scientific report presented before the Franco-Belgian Dental Association meeting held at Paris, France.

tooth diseases. It was the American, Doctor Rosenow, who, in 1914, gave the study of this subject a serious impetus which brought it to the attention of the medical and surgical world.

It is not too much to say that, after Rosenow, practically all the American and English authors who have written with regard to the teeth have shown themselves to be fervent advocates of Rosenow's theories, recognizing that all sorts of ocular affections are of dental origin. In Europe, on the contrary, there has been a much more reserved attitude, but it must be noted that from all the European countries there have come scattered descriptions of cases which made it very clear that there was a distinct and close relationship between maladies of the teeth and various eye diseases.

The Scandinavian literature brought only one case, which was described by Elander in a Swedish dental review. The various authors are unanimous in recognizing that dental affections have great importance relatively to the origin of ocular affections. Some of them are quite ready to declare that the great majority of cases of iritis which are not of syphilitic origin can be traced to a dental origin. Others more conservative in their estimate say that perhaps not more than 10 per cent. of the cases are of dental origin. There is no doubt that, looked at from a general point of view, there is a very definite relationship between these two sets of organs.

There are three ways in which tooth disease may affect the eye: first, by contiguity; second, by metastasis which follows the blood- or lymph-vessels; and third, by reflex through the nervous system. All the various affections of the eye may thus be traced to the teeth, in certain cases, at least.

AFFECTIONS OF THE EYEBALL AND OF THE ORBIT

The first of these groups of eye affections dependent on dental disease comprises the affections of the globe or of the orbit. These usually occur by tissue connectives and there is no question about their direct relationship.

Schmidt-Rimpler (Vienna, 1898) reported that many of the patients among whom pulling of the teeth has been followed by blindness suffered from an affection in the maxillary sinus which had served as a path of transmission. The exterior surface of the maxillary sinus can also spread inflammation into the eye. Hirsch

made a report where complete blindness was produced as the result of an atrophy of the optic nerve in connection with the extraction of the second upper pre-molar. There was question, in this particular case, of an alveolar periostitis of purulent nature on the anterior surface of the upper maxillary which found its way across the edge of the orbit and penetrated into the orbit itself, where it provoked an inflammation of the cellular tissues. This brought about an optic neuritis which was followed by atrophy of the optic nerve.

Graefe-Saemisch (Berlin, 1925) claims that the infectious material which is contained in inflamed cavities in the neighborhood of the anterior facial nerve can penetrate into the orbit, producing phlegmon and thrombophlebitis. This may affect the maxillary sinus and penetrate even to the base of the brain. This infectious material may even determine by a thrombophlebitic process the obstruction of the veins of the dura mater and of the ophthalmic vein of the other side. Observations analogous to these have been made by Picus, by Paul Pesme (1929) and by Doctors Lagrange and Mathieu in Paris. At our university hospital in Copenhagen we have made observations on two cases where the relationship between a dental affection and a phlegmonous process in the orbit was evident. These cases were reported in the *Danish Medical Review* (1925).

One may see in the region of the eyes fistulas communicating with an inflammation of the dental roof. Sometimes it happens that these fistulas bring about the symptoms of inflammation in the lachrymal gland. The orifice of these fistulas which may be traced to the canine or molar teeth open a little below the eyes but do not communicate with the lachrymal glands. Meyerhoefer reports a case where the pus from the teeth had penetrated across the bone to the internal canthus of the eye, where it perforated the skin. I have myself seen cases of that kind. There was question of the occurrence of a periodontitis of purulent character, chronic in process, in connection with the canine teeth.

A genuine dacrocystitis brought about by direct perforation of the lachrymal sac, the process originating in an abscess at the root of the tooth, has been reported by Lempert, but these cases are extremely rare. Occasionally one finds, though these cases also are rare, a fistula near the external canthus which derives its origin

from a pre-molar or a molar tooth of the upper jaw. We have seen at the University Hospital of Copenhagen a fistula that opened near the outer canthus due to a dental affection. The patient was a girl of fourteen suffering from a follicular cyst which had become infected by the first molar tooth of the upper jaw.

It is not rare to find a simple conjunctivitis combined with an acute periodontitis of the same side. I have recently seen an acute periodontitis traceable to the second pre-molar tooth which was accompanied by edema so accentuated that it caused the almost complete closure of the left eye. The site of the affection was of dark red color with a good deal of inflammation; the lids were inclined to stick together and there was a moderate flow of tears with a good deal of pain below the eye. All the symptoms went down rapidly just as soon as the tooth was pulled.

CORNEAL AFFECTIONS

According to Bach, an affection like herpes of the cornea is always of dental origin. He has demonstrated that the carious teeth of these patients always enclose the virus of herpes and he has demonstrated also the presence of very bad teeth among the patients suffering from this affection. Bach has proved also that it is possible to light up a herpes of the cornea by inoculating the cornea of the rabbit with substances taken from the granulomatous processes at the roots of teeth. He is very much inclined to think that the infection makes its way along the nerves to the cornea recognizing that herpes propagates itself by paths which follow the nerve. Nevertheless, a direct infection carried by the patient himself from the tooth to the eye, the infection being carried by the fingers, may also occur and is at least not impossible. Jost, of Strasbourg, has seen keratitis cured by treatment of the teeth and an observation of the same kind has been made by Stratenam.

IRITIS

Now we pass to iritis and iridocyclitis, which are the ocular affections which have especially interested a great majority of those who write about diseases of the teeth in their relation to the eye. The connection existing between dental affections and iritis has

furnished matter for a number of articles, notably by Dr. E. C. Rosenow in America.

It would be superfluous here to go over the theories and observations of this writer. His observations tend to prove that the cultures of microbes drawn from granulomas and abscesses at the roots of teeth in patients who are suffering at the same time from eye diseases set up equally among animals which are experimented on a high percentage of ocular disease. He thinks that he has demonstrated that in certain conditions the *streptococcus viridans* becomes transformed into the hemolytic streptococcus which works very serious harm. This point is, however, as yet a subject for discussion.

So far as the theory on the selective property of microbes, some of which set up affections in certain parts of the body and not in others, is concerned, this does not seem to rest on a base sufficiently established.

Haden, one of the most ardent disciples of Rosenow, is a partisan of this theory, but the elective power of microbes as he sets it forth has not yet been demonstrated satisfactorily or witnessed clearly in Europe.

Bach declares that streptococci occur regularly in the dental root granulomata but that these are not pathogenic for the mouse and especially they do not show any elective pathogenicity for the eye in rabbits. When introduced into the eye they do not produce any different effect from those which are noted in the case of ordinary pyogenic microbes.

Kenneth Campbell denies the existence of rheumatic iritis and he considers that iritis is generally, that is in all but less than 10 per cent. of the cases, connected with affections of the mouth though not necessarily only the teeth though it may come from nutritional disturbances.

CAN DENTAL LESIONS BE THE CAUSE OF IRITIS?

B. F. Lang is of the opinion that out of 176 cases of iritis, seventy-one under his observation were caused by infections from the mouth. Sir William Lang claims that out of 215 cases of iritis which had been demonstrated to be of septic origin, 139 were due to pyorrheic causes or came in some other manner from infections of the teeth. Worth considers that 50 per cent. of the cases are due

to septic condition of the buccal cavity or some analogous cause. Frederick declares that in 200 cases of iritis, alveolar pyorrhea was the cause of it exclusively in some seventy-four cases. Bell, Krebs and Patterson witnessed cases of cure of iritis by dental treatment. Benedikt declares that 20 per cent. of the iritis cases are due to dental affections or else to infected tonsillar conditions. Beddell declares that the iris, the ciliary body and the choroid constitute the parts of the eye which are beyond all discussion associated with dental infection. Other tissues are very rarely affected.

Llamas reports some cases of iritis and iridocyclitis with amelioration at once after dental treatment was instituted, though nothing else was done for the patient. Bach had the opportunity of studying carefully the dental conditions existing in fifty patients suffering from iritis and iridocyclitis of uncertain origin. He was careful first to exclude all cases that were syphilitic and also all patients who were manifestly suffering from any clinical symptoms of tuberculosis.

In these fifty cases he has had negative dental reports with regard to only four, which would seem to show that in over 90 per cent. of the cases he has found bad teeth and especially chronic periodontitis or alveolar pyorrhea. These studies permit him to establish as a conclusion that what one finds generally in the teeth is about what one finds also in people who are suffering from no eye infection. His study then is of very little value in the matter. So far as concerns simple iritis, he has found dental conditions pathologically positive, relatively frequently on the same side as the iritis. Among patients suffering from iritis he notes that the teeth of the upper jaw are more often attacked than those of the lower jaw, but he calls attention to the fact that caries of the teeth is much more frequent in the upper jaw than in the lower.

The positive pathologic dental conditions that are dangerous are teeth with granulomata on their roots and portions of teeth that have been allowed to remain in the jaw after the body of the tooth has been removed. He has found that paradontosis, that is, inflammatory conditions around the teeth, is not at all frequent, and he thinks that he has found that alveolar pyorrhea is relatively much less harmful to other parts of the organism than abscessed roots or granulomata.

Bach insists that in three cases the clinical evolution of the eye

condition and also of the tooth condition improved very much after the extraction of the tooth. In the *Journal of the American Medical Association*, 1923, Irons and Brown have given an account of altogether one hundred cases of iritis. In nine of these the dental origin of the eye condition in an alveolar abscess was apparent and in five of these nine cases it was impossible to find any other source of infection. In each of four other cases they have been able to show the presence of an infection of the tonsils or of a sinus. An abscess at the root of a tooth was found in forty-three patients while eight belonged to the syphilitic group and fourteen were set down to be classified under the tonsillar group. Only one had an infection of the sinus while no less than nineteen patients had mixed infection. In this last group were found two cases who carried an alveolar pyorrhea easy to demonstrate, and the authors express the opinion that it is very possible that these two cases belonged to iritis of dental origin, although they have not been able to demonstrate that alveolar pyorrhea is at all frequently associated with metastatic lesions. In more than two-thirds of the cases, more than one possible source of infection was traced that might have caused eye trouble from oral lesions.

Raton and Chassignon have published the fact that in 1928 some of their cases of iritis were cured by dental treatment. Monbrun, of Paris, and Fromaget have had the same experience.

Among the fifty patients stricken with iritis and whose cases have been studied partly at the University Hospital of Copenhagen, partly outside of the hospital, the following results and observations have been secured. Permit me to add that none of these patients was syphilitic and that all the patients of that category had been set apart before the beginning of the study. Here, then, are the observations:

Three patients presented a dental condition that was absolutely irreproachable. Their iritis was surely not due to their teeth for they were without dental pathology of any kind.

In five of the patients, all the teeth of the upper jaw and some of those of the lower jaw were missing. The teeth still present were perfectly healthy. The extraction of the missing teeth had taken place a number of years before, so that it was very unlikely that there were any remains in the gums of infected remnants.

Six patients who were suffering from a double iritis had bad

teeth in both their jaws, with periodontitis of chronic character complicated by granulomata. Dental treatment in these cases brought no improvement though there seemed no doubt that there must be a connection between their double iritis and the badly affected teeth.

Thirty-six of the patients were suffering from simple iritis or iridocyclitis. Among these patients sixteen had granulomata or were suffering from chronic periodontitis on the same side as the iritis, while twenty patients suffered from dental affections simultaneously on the right and the left side both in the superior and the inferior maxillary.

For six of the whole number of fifty patients there seemed to be no doubt that there had been a distinct amelioration of the iritic condition which had occurred almost immediately after the extraction of the teeth that proved to be ailing, but some months later these patients returned suffering from relapse of their ocular affection.

In one of these patients all the symptoms of the ocular affection disappeared after an interval of two days, following almost immediately the extraction of a molar carrying a small abscess which was situated on the same side as the iritis. This patient had suffered for several years from headache localized at the back of the head. His headache disappeared at the same time as his iritis and since that time—that is to say, during more than three years—the patient has had no more trouble from his headache and has been very glad to announce himself as completely cured of his iritis.

From time to time choroiditis has been observed in connection with or at least existing simultaneously to some dental affection. These seem to occur particularly in connection with chronic inflammation located in the pre-molar teeth in the half of the jaw corresponding with the eye of the patient that was affected. In cases of this kind, Wirtz, Guttmann and others have observed a very definite amelioration of conditions after extraction of the affected teeth.

Terson has published a description of a case of neuroretinitis of the hemorrhagic variety which he was certain was of dental origin. Some observers have seen cases of neuritis of the optic nerve conjointly with dental affections. A number of observers are agreed in this observation, and reports have come from Archen, Hall, Stutz, Hillemann, Dutoit, Bach and others.

Dr. Louis Dor writes in the *Semaine Dentaire* (*The Dental Week*, 1925) that detachment of the retina sometimes occurs as a

consequence of the presence of granulomata on the roots of the teeth. He is very definitely of the opinion, moreover, that alveolar pyorrhea can bring about the formation of cataract. It seems to me, however, that the proofs in support of this theory are lacking.

Bach has observed five cases of retrobulbar neuritis all in connection with positive pathologic conditions demonstrated in the teeth, and he is of the opinion that whenever there is question of this affection it is important to eliminate always any possible dental pathologic etiology. He is led to believe that there are some rather close relations between dental affections and retrobulbar neuritis, but also with multiple sclerosis, the well-known progressive affection of the central nervous system which is such a serious incurable disease developing mainly among comparatively young patients.

Immediately after the appearance of Bach's article on this subject, I had the opportunity to examine, with the idea of detecting any dental lesions or pathology, two patients who were suffering from retrobulbar neuritis. These two patients had, nevertheless, perfectly healthy teeth, so that it was quite certain that there was no connection between any dental affection and their neuritis. This, however, does not demonstrate, be it well understood, that there may not be often some definite relationship between chronic intoxication, or toxemia, due to focal infection and the neuritises, and that this chronic intoxication may be itself a consequence of chronic dental affections. It is manifest, however, that once one accepts with assurance that a retrobulbar neuritis can be lighted up by inflammation existing in the ethmoidal sinus or in other secondary cavities, it is extremely important to inquire as to the possible existence of dental affections and that all the more because there can be a rather close connection between dental affections and pathologic conditions, which have their seat in the secondary cavities of the jaws and forehead.

Some patients who are stricken with glaucoma have the habit of complaining from time to time of pains connected with the teeth which sometimes disappear after the glaucoma has become outspoken. Dr. Paul Brusselmann has given a description of one case of this character that is very interesting.

As a result of systemic intoxication or toxemia following an attack of diphtheria or of typhus fever or influenza, there has often been observed for some time after convalescence has set in an

asthenopia or weakness of sight which progressively grows less, taking a longer or shorter period for complete cure or definite betterment. Besides, one hears of patients suffering from chronic dental affections and especially purulent abscesses from granulomata who complain of a progressive weakness of vision whenever they are fatigued or feel ill at ease. In treating these cases either by section of the root or by extraction of the affected teeth, and by the elimination of dental pathologic conditions, the sight returns and the depression from which the patient suffers disappears. In these patients it is perfectly clear that there can be no question of a continuous intoxication due to virulent microbes at the roots of teeth.

REFLEX AFFECTIONS OF THE EYE

In conclusion, I shall say a few words upon reflex affections of the eye that may have some relation to dental diseases.

Fromaget is of the opinion that dental granulomas can cause reflex ocular lesions not only because of the microbic agents which they enclose, but, in addition to that, because of the local irritative phenomena which are likely to be connected with them.

It is not infrequent for patients suffering from pulpitis of the teeth to complain of pains below the eye. Indeed, it not infrequently happens that the only complaint that the patients have to make is that they have something the matter with their eyes, although the pathologic condition from which they suffer is, in all truth, a pulpitis situated most frequently in the neighborhood of a tooth in the upper jaw. On the other hand, it sometimes happens that patients suffering from iritis, and, above all, from glaucoma, complain that they are suffering from toothache, though it will be found that the tooth of which they complain is perfectly healthy.

It is not a rare occurrence to find in connection with the pulpitis an epiphora which is very pronounced during the attacks of pain, and at the same time a definite conjunctivitis is present and the conjunctiva is found infected. These are cases where the symptoms, subjective and objective, disappear, I may say almost instantly, just as soon as the tooth responsible for them is put under treatment.

Dental inflammations can provoke also pains in the eye.

From this study it may be concluded that at times ocular affections are associated with dental pathologic conditions. This is more rarely the case than certain authors in England and America are

inclined to think, so far as can be judged from our experience, but without any doubt more frequently than physicians are prone to believe in most of the European countries.

According to all appearances, there is question most frequently of the toxic effect produced by microbic toxin, an explanation which is supported above all by the rapidity of the curative effect produced by the elimination of dental lesions. When there is question of an infection which finds a way into the eye itself, I find it very hard, I must confess, to explain how this immediate interruption of the ailment comes about by the suppression of its primordial cause, that is to say, by the extraction of the affected tooth. If, on the other hand, one admits the theory of toxic effect, it becomes evident that by the suppression or elimination of the dental conditions which engender the toxins, the effect of the intoxication ought to pass off after a shorter or longer delay. A great deal will depend on the individual in such cases and his natural immunity and power to throw off diseased conditions.

It may be that a metastatic infection may take place and there can be no question but that that occurs occasionally. It is a rather difficult matter, however, to unravel the connecting links, since, in spite of the extraction, it may not be possible to repair whatever evil has been done.

In applying dental treatment to patients suffering from eye affections, the origin of which is unknown, it would be necessary to treat the dental pathologic conditions just as if it were recognized that they were the source of the ocular affection, whatever it may be. This will always be the case but particularly when there is question of infectious ocular affections or toxic processes that carry with them danger for the sight and for which one is not sure in advance of the original causes. Among these are especially the eye affections that are due to syphilis or tuberculosis.

As Doctor Terson has said, we must recall that an ailing tooth can, though it may be only exceptionally, bring about a serious optic neuritis and its extraction may mean rescue from blindness. It is important not to forget another striking expression by that same author: "We are saving too many teeth that represent danger for the sight, if not for life."

WIDAL AND HIS WORK*

By M. PASTEUR VALERY-RADOT

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THE work of Widal will undoubtedly appear in the future as one of the most fecund in medicine. Anyone who considers what biologic researches as applied to the examination of patients represented before Widal and what they became in his hands will realize that here indeed was a magnificent step forward in diagnostic, preventive and therapeutic medicine. It was he who endowed medicine with serodiagnosis, a method which permits the physician to recognize an infection by the humoral proprieties developed in the body under the influence of a specific agent. He showed also that the diagnosis from microbic infection could be made without knowing the infectious agent itself. As a result of his work the diagnosis of typhoid fever became singularly easy. It had been declared before his time to be one of the most difficult problems in medicine. The specificity of the bacillus of Eberth in the production of typhoid fever was demonstrated at the same time. Finally, based upon this discovery, which dates from 1896, clinical serology was born.

Professor Widal was a pupil of Cornil. He understood very well the immense field which had been opened in medicine by the discoveries made by Pasteur and he devoted himself even from his twenty-fourth year, when he was as yet only a hospital interne, to the study of the bacteriologic diagnosis of the bacillus of Eberth as well as of the colon bacillus, and he demonstrated, as was said, in a fashion that set the subject beyond all further discussion the specificity of the bacillus of Eberth.

His thesis on puerperal infection as well as on phlegmasia alba dolens and erysipelas, in which he showed that the three affections, apparently so different from one another, are all due to the streptococcus, gave to the teaching of Pasteur with regard to the specificity of germs a remarkable demonstration, and introduced into

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* A conference delivered at the Hôtel Chambon, Paris, March, 1931.

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medicine the notion of the differing virulence of individual microbes of the same species.

Thanks to his researches in cytodiagnosis, he showed with Ravaut how the examination of cells thrown down by centrifugation in a few cubic centimeters of fluid permits the differential diagnosis as to whether a pleural effusion is tuberculous, septic or mechanical. He showed with Sicard and Ravaut how the cytology of the cerebrospinal fluid enables the clinician to make the diagnosis between a tuberculous meningitis or an acute cerebrospinal meningitis, or, on the other hand, to differentiate them from a syphilitic affection of the central nervous system.

Taking up the question of nephritis, which, up to that time, had been a mass of confusion, he showed how it would be possible to penetrate by careful study into the physiopathology of these maladies. In the course of a dozen years, thanks to his remarkable perspicacity and to his profound penetration in the study of morbid symptoms, he went far to set order into the chaos of nephritises and separate three great syndromes which are connected with retention of nitrogenous material and with hypertension. There is no doubt that a good many chapters will be added in the future to those which Widal thus opened up, but the fundamental facts established by him will surely remain undisturbed because they are founded on observation and not theory. The edemas are caused by the retention of sodium chloride, common salt. Treatment by means of salt deprivation affords testimony every day to this primordial observation. Nitrogenous retention is the most important element in the prognosis of chronic nephritises. No physician dare now pass over an investigation of the nitrogenous products in the blood in the study of kidney diseases. Widal's work in renal pathology, if it contained nothing else except these two facts, will remain in the future as important at least as that of Bright himself.

Widal's most important practical work remained to be done, however. This was what concerned the preparation of an antityphoid and antiparatyphoid vaccine. During the war he occupied himself in connection with Salimbeni in the preparation of an antityphoparatyphoid vaccine of which all those familiar with the medical history of the war know the remarkable results. From the moment when this vaccine was applied, typhoid and paratyphoid fevers dis-

appeared from the armies. It was on the principles established by him and by Chantemesse in 1888 and 1892 that this vaccine was manufactured.

During the months just preceding the war and during the years which followed after 1919, he devoted himself to the study of the phenomena produced by shock in medicine. With Abrami, Brissot and Joltrain he showed that certain asthmas as well as certain urticarias and other pathologic manifestations are analogous to the phenomena of anaphylaxis as they have been studied in the laboratories. The observer notes in these affections a vasculosanguinary crisis identical with that described in the course of experimental anaphylaxis to which Widal gave the name of hemoclasic crisis. This precedes the clinical crisis.

Pushing the study of the hemoclasic crisis to a further extent, Widal showed that the observer would note it at the beginning of numerous syndromes which are not quite of the same character as anaphylaxis. Some of these he called phenomena of shock. They are due to the brusque penetration into the organism of heterogeneous albumins or even crystallized substances or may be provoked by some physical action such as cold. A whole department of pathology was opened up in these phenomena of shock which have no specificity and which one can treat by a therapeutics which is not specific. They are entirely opposed to symptoms due to intoxication.

It was not only the discoveries made by Widal which remain as a precious heritage, but it is also the spirit in which they were made which has deeply modified medical thought in our day. More than any other single person of our generation he tried to make medicine an exact science. "I have always," he said, "been penetrated by the thought that the cultivation of the physical and natural sciences was among the first obligations incumbent on the physician who wished to devote himself to medical research. These sciences, beyond the fact that they open up without cessation new horizons, furnish the investigator with exact means of research, with definite technical rules and with accurate procedures which enable him to apply accuracy where before there was only indefiniteness and more-or-lessness. It enables the investigator to find certitudes where before he could secure only impressions. It is in applying," Widal

said in conclusion, "the methods of these sciences that medicine itself becomes a science."

Widal's method of work and observation was very interesting. Nothing is more instructive for the novice in medicine than to study Widal's work and methods. His reading and clinical observations led him to pose a question which became from then on his dominant preoccupation. He turned the problem so as to see its many aspects and endeavored to approach it from many faces. At the beginning one saw only the end he had in view. Then, little by little, light began to show here and there and insensibly all the secondary facts without importance for the special problem were thrown aside. With rare knowledge and discernment he went straight to the heart of the subject and showed exactly the precise point of attack. Then where all had seemed obscurity before, all at once light shown out and the problem was solved. It is easy to understand how much experience he had to have and how carefully he had to study his cases in order to reach the solution. From this moment no part was left to interpretation or to theorizing. The only response that would satisfy him was yes or no. Widal himself, anxious as to results, was at our side or telephoned us nearly every hour in order to follow the various phases of the experimental observations or to check up on the clinical observations. He had in this matter a juvenile enthusiasm which carried him on even after he had been many years devoted to clinical observation. When the experimental observation or the clinic gave the response, he led us on, full of ardor, to the heights from which a new world opened up before us.

Widal was not only a learned man, he was above all a teacher beyond compare. He had as his background the tradition of Trousseau and of Dieulafoy, his beloved master whom he admired and reverenced always profoundly. It was a joy to the spirit to see him give a clinical lesson at the bedside of a patient. Among the multiplicity of symptoms he knew how to choose those that had the principal value and he would go on to reconstruct the clinical history so as to arrive at an etiologic and syndromic diagnosis which completely satisfied. From here he lifted us up to considerations of general pathology. His very practical clinical power utterly

opposed to pathogeny not supported by the facts led him always back to the patient.

He was a veritable principal of a school because he had the power of animating others to work like his own. He had enthusiasm but it was always controlled by the critical spirit. He was the master, "the patron," but also the friend. At times of discouragement it was sufficient to hear his voice, to speak with him to find confidence once more in life. His students looked up to him with an admiration that was doubled by a profound affection.

In order to judge him properly one must ask oneself the question, what would have become of medicine if he had not lived? How could we get along today without serodiagnosis, without cytodiagnosis, without the methods of functional examination for the nephritises, and without the notions which he gave us as regards the phenomena of shock? But more than that. Widal came to his work just in that troubled period when the physicians had begun to ask themselves whether they would continue in the path of clinical observation or whether the laboratory alone without the clinic was going to permit them to make the diagnosis of disease. Widal was the one who was to lift up the clinic to the elevation which it holds and to make the laboratory the associate of the clinic.

His work is immense and will in the future appear even greater than it is at present because he knew how to ally the spirit of the great clinical master, Trousseau, to the great laboratory spirit of Claude Bernard and of Pasteur.

"Widal, the scientist as well as the clinician, knew how to gather round him numbers of disciples. Undoubtedly, these will continue and will expand his work so that Widal's fame will increase rather than diminish in the time to come. The conference on him and his work by M. Pasteur Valery-Radot was one of the most numerously attended in the series that was given this spring in the Hotel Chambon." Editor, *Le Siècle Médical*, Paris.

BRONCHOSCOPY IN THE TREATMENT OF PULMONARY DISEASE*

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Introduction.—In principle, bronchoscopy is merely a form of specular examination. The only thing that prevents its becoming a routine procedure in all hospitals, performed by everyone interested in the diagnosis and treatment of diseases of the chest, is the fact that for its safe and efficient performance a very special training and experience, and a trained organization are required.[16]

The time is not far distant, however, when every large hospital will have its Bronchoscopic Clinic, to which the internists and surgeons will unhesitatingly send their patients suffering with acute and chronic diseases of the chest for at least one "diagnostic" bronchoscopy.

We bronchoscopists claim no magic healing powers. We simply wish to be given an opportunity to use the bronchial speculum to inspect the interior of the trachea and bronchi and report to the internist and the surgeon what we see. We can secure tissue specimens for histologic examination, as well as uncontaminated specimens of bronchial secretion for bacteriologic examination and the preparation of autogenous vaccines. In some cases we feel that bronchoscopic treatment is indicated. In every case, however, diagnosis and treatment call for team-work. The best results will be obtained by the concerted efforts of the internist, the roentgenologist, the bronchoscopist, and the surgeon, with the aid, of course, of the pathologist.

Suppurative Disease.—Pulmonary abscess and bronchiectasis are perhaps the conditions one first thinks of in connection with bronchoscopic treatment of disease. Bronchoscopy is indicated to rule out the presence of some obstruction to drainage, such as foreign body, stenosis, granulation tissue, neoplasm, or viscid secretions. If such obstruction is found, it can in many cases be removed with the

bronchoscope. The drainage of any suppurative focus communicating with a bronchus can be improved by bronchoscopic aspiration.[14]

It is not only in America that bronchoscopy is becoming generally recognized as an important item in the treatment of suppurative diseases of the lung. Gutteridge,[7] of Australia, reports enthusiastically his work in this field, as do also Martin,[24] of Edinburgh, and Lemariey[21] and Soulas,[30] of Paris.

Pulmonary Abscess.—The mortality of this condition has always been high. Lord[22] has declared it to be 74 per cent. in unoperated cases. He states also that under medical management alone recovery occurs in only about 11 per cent., with incomplete recovery in about 15 per cent. Clerf[6] reports a cure by bronchoscopic treatment of 54 per cent. of the patients in a series of 121 cases. Sixteen patients showed improvement, twenty-eight were eventually referred to the surgeon, and three died. The best results are obtained in early cases. Bronchoscopy should be instituted as soon as possible after the onset of symptoms. About half of Clerf's patients were treated bronchoscopically within three months of the onset, and of this group, 70 per cent. made a complete recovery.

A large percentage of the pulmonary abscesses referred for bronchoscopic treatment are postoperative cases, and most of these are post-tonsillectomic. The postoperative cases usually respond better than others to bronchoscopic treatment.

Kernan[17] speaks enthusiastically of bronchoscopy in pulmonary abscess, and advises its being done in every case. He, and also Herriman,[8] report good results from the bronchoscopic instillation of argyrol solution.

CASE REPORTS

CASE 1.—A. C., male, aged forty years, with productive cough, abundant greenish sputum of foul odor, fever, chills, loss of weight (twenty-five pounds in two months). X-ray (Fig. 1A) showed a large abscess in the right upper lobe, with cavitation and fluid level. Bronchoscopy showed pus coming from the right upper lobe bronchus. (See Fig. 2.) Bacteriologic examination of bronchoscopically aspirated secretions showed no tubercle bacilli, the predominant organisms being non-hemolytic streptococci and the staphylococcus albus. An autogenous vaccine was prepared and administered in small doses. Further bronchoscopies were done for treatment, pus being aspirated with a curved flexible-tipped aspirator, and mercurophen (1/8000) instilled. After four bronchoscopies the patient was much improved and the X-ray showed that the cavity, though still present, was much better drained. This patient was treated

CASE I.—Pulmonary abscess cured by bronchoscopic aspiration. A, before treatment;
B, after treatment.

FIG. 2.
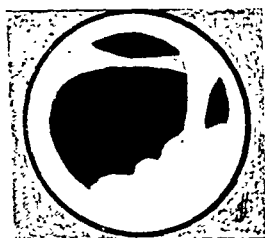
Sketch showing the bronchoscopic appearance of pus coming from the right upper-lobe
bronchus as seen in cases of abscess of the right upper lobe, such as those reported in the text.
The upper-lobe bronchus can be very satisfactorily aspirated with the curved flexible-tipped
aspirator.

FIG. 3.

Pneumonogram made by bronchoscopic instillation of lipiodol after aspiration of pus in a case of bronchiectasis. (Instillation by Dr. Emily L. VanLoon.)

FIG 4.

Roentgenogram showing screw in right bronchus of a boy treated for several weeks for "bronchitis and asthma." This illustrates the importance of prompt roentgen-ray examination in all cases of disease of the chest.

twice a week for about four months before complete clearing of the abscess (Fig. 1b). In that time he gained over forty pounds in weight and his red blood-cells and hemoglobin rose from 3,310,000 and 66 per cent. to 5,000,000 and 90 per cent. respectively, while his white blood-cells fell from 15,000 to 8,050.

CASE 2.—D. M., male, aged thirty-one years. Symptoms dated from five days after tonsillectomy done three weeks previous. There was cough, expectoration of yellow pus, occasional pain in the chest, and a weight-loss of twenty pounds. The X-ray showed an abscess in the right upper lobe, with cavitation and a fluid level. Bronchoscopically removed specimens were negative for tubercle bacilli and gave an almost pure culture of streptococci. An autogenous vaccine was prepared and given in gradually increasing doses at intervals of five to seven days. After ten bronchoscopic aspirations with instillation of mercurophen (1/8000) the abscess cavity was no longer visible.

Bronchiectasis.—Diagnostically and prognostically, pneumonography is of the greatest aid, by showing the extent of the lesion and the degree of dilatation of the bronchi. Bronchoscopic introduction of bismuth powder or lipiodol, after aspiration of pus, is the most efficient and accurate technic that can be employed. (See Fig. 3.)

As for treatment, bronchoscopic aspiration and medication is of great palliative value in almost all cases, and in the less extensive, more recent cases, it is curative. In several cases, patients sent to us with a diagnosis of bronchiectasis have been found to harbor a nonopaque foreign body, as, for example, a bone. (The writer[15] has recently reported some cases of this kind.)

Clerf[2] has studied the relation between disease of the nasal accessory sinuses and bronchiectasis, emphasizing the importance of treatment of the sinuses simultaneously with the bronchi. I. Ruebert Smith,[20] of Toronto, very recently reported a long series of cases studied from this point of view.

Chronic Tracheobronchitis.—Many patients are sent to the Bronchoscopic Clinic because of "chronic cough," not profusely productive. Roentgenographic study may show some peribronchial thickening, or it may show practically nothing. Physical examination may likewise be practically negative. On bronchoscopy we find only a chronic tracheobronchitis. Specimens of secretion are removed and autogenous vaccines prepared. A soothing medicament such as monochlorphenol (1 per cent.) may be applied directly to the bronchial mucous membrane if desired. In these cases, as in those of bronchiectasis, the nasal accessory sinuses should be thoroughly studied, and treated according to indications. In children especially,

this condition probably leads in many cases to bronchiectasis, and it calls for the coöperation of the paediatrician or internist, the rhinologist, and the bronchoscopist.

Influenzal tracheobronchitis in children sometimes requires bronchoscopy for aspiration of crusted secretions causing severe croupy cough and dyspnea.

Tracheobronchial diphtheria calls for bronchoscopic removal of membrane and secretions when diminished breath sounds and impaired percussion note indicate bronchial obstruction.

Asthma.—When we are asked what bronchoscopy can contribute in the treatment of asthma we always feel obliged to emphasize the fact that a wheeze doesn't necessarily mean asthma, but that it does call for a diagnostic bronchoscopy. We have often found, on direct examination, that the "asthmatic" patient really owed his wheeze to a foreign body (Fig. 4), a bronchial stenosis, or an endobronchial neoplasm.

Even in cases of true asthma, however, we have found that bronchoscopic aspiration of viscid secretions will often give very great relief. Also, the endobronchial application of cocaine and adrenalin solution (Lukens[23]) and other medicaments has been of value. Autogenous vaccines may, of course, easily be prepared from bronchoscopically removed bronchial secretions. Lukens,[23] Moore,[26] and Clerf[3] have all found bronchoscopy of advantage in both diagnosis and treatment.

Bronchial Stenosis.—Stenosis of a bronchus may be due to compression by mediastinal glands; it may be cicatricial, granulomatous, neoplastic, or it may be congenital. Bronchoscopic dilatation is usually indicated for treatment, and if there is impairment of drainage, pus can be aspirated from below the stenosis after dilatation.

Benign Growths.—In a number of the patients that have come to the clinic with a diagnosis of asthma, we have found that a benign neoplasm was partially obstructing the bronchial lumen and causing the wheeze on which the diagnosis of asthma had been based. Benign growths are easily removed by means of forceps introduced through the bronchoscope. Myerson[27] has reported an interesting case of this kind. At least ten similar cases had been previously reported by various writers. An excellent review of the literature on this subject was presented recently by Ellen J. Patterson.[28] Bronchoscopy in the

Fig. 5.
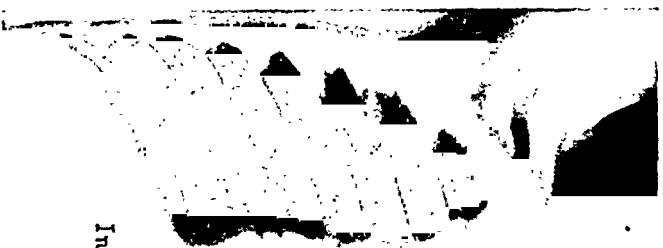
Inspiration

Fig. 6.

Expiration

Figs. 5 and 6.—Woman in whom a positive diagnosis of tuberculosis of the right bronchus was made by bronchoscopy. A series of sputum examinations had been negative. Bronchoscopy revealed ulceration and stenosis of the right bronchus and a bronchoscopically removed specimen of secretions contained numerous tubercle bacilli.

diagnosis and treatment of new growths of the bronchus, benign and malignant, has also been recently discussed by Chevalier Jackson.[11]

Cancer.—Endobronchial cancer may be inspected, and a specimen taken for biopsy, through the bronchoscope. Also, radon seeds may be implanted in the growth for treatment. A plea for bronchoscopy as an early means of diagnosis in these cases was made by McCrae,[25] Funk,[25] and Jackson[25] some time ago.

Kernan[19] has reported an unusual case of endobronchial cancer treated and apparently cured by endobronchial methods. After partial removal of the growth, he implanted radium needles and applied surgical diathermy by means of the bronchoscope.

Spirochetoses and *mycoses* may often be diagnosed and treated with the bronchoscope. In spirillar and spirochetal infections, arsephenamin may be applied locally through the bronchoscope (dissolve 0.1 gm. in 5 cubic centimeters of water), in addition to its intravenous administration. Neoarsphenamin is generally preferred for the latter purpose, and 0.45 gm. in 20 cubic centimeters of water every five or seven days for three or four doses is sufficient. Sulpharsphenamin also has been used.

Kernan[18] reported a very interesting case of actinomycosis in a child three years of age, which he treated bronchoscopically.

Tuberculosis is not amenable to bronchoscopic treatment by any method thus far worked out, though bronchoscopy is of aid, in obscure cases, for diagnosis. (See Figs. 5 and 6.)

Obstructive Atelectasis and Obstructive Emphysema.—These are conditions that call for diagnostic bronchoscopy. Their importance and their significance are becoming very generally recognized. Obstructive atelectasis is due to complete bronchial obstruction, and obstructive emphysema to incomplete bronchial obstruction. In the former, the obstruction acts as a stop-valve mechanism; in the latter it acts as a check-valve mechanism, which allows the air to go into the lung but does not allow it to go out. (Occasionally a check-valve mechanism may cause atelectasis, if the "valve" is set in such a way that air is allowed to escape from the lung but is prevented from entering.) Very often, bronchoscopy will reveal a foreign body as the cause of obstruction; sometimes it will reveal some other cause. This subject.was recently very thoroughly discussed by Chevalier Jackson.[12]

Obstructive atelectasis may result from obstruction of many different kinds. Postoperative atelectasis is due to the corking of a main or large bronchus by a plug of viscid secretions. If this plug *is not coughed out or bronchoscopically removed, abscess will follow.* If both lungs become obstructed, the patient will asphyxiate. Bronchoscopic aspiration is the surest method of opening up the airway in these cases, and it should be resorted to without delay, though it is true that many cases of postoperative collapse will clear up on postural treatment and avoidance of cough sedatives. Lee and his co-workers[20] have reported the experimental production of obstructive atelectasis in the dog by the bronchoscopic introduction of acacia solution into the bronchus.

Tucker[31] reported a series of cases of obstructive atelectasis in which the etiology included asthma (obstruction due to viscid secretion), benign neoplasm, endobronchial cancer, and foreign body. He reported also several cases of the postoperative type. All of these patients were cured by bronchoscopy except the patient with the endobronchial cancer, and enough of the growth was removed in his case to permit aëration of the obstructed lung for a time, deep Roentgen-ray therapy being applied in addition.

An excellent discussion of the subject of acute massive collapse, with a full bibliography, will be found in a recent paper by Bowen.[1] Coryllos and Birnbaum[5] have done a large amount of experimental work on obstructive atelectasis, and also on lobar pneumonia, which they regard as "an infectious (generally pneumococcic) lobar atelectasis." They have gone so far as to suggest and apply bronchoscopic treatment in lobar pneumonia, in the human patient.

Obstructive emphysema is one of the most interesting and significant phenomena in the diagnosis of diseases of the chest. As stated above, it results from incomplete bronchial obstruction, such as to allow air to pass in but not to pass out of the lung. While careful fluoroscopic and roentgenographic study will not fail to reveal it, this condition is often overlooked by the inexperienced roentgenologist. Under the fluoroscope the heart is seen to move away from the obstructed side on expiration, because the uninvaded lung empties itself, while the invaded one remains ballooned. In obstructive atelectasis there is much less side-to-side motion of the heart with the phases of respiration. It tends to remain drawn over

toward the affected side.   In order to demonstrate obstructive emphysema on films, a pair of exposures should be made, one on full inspiration (in which the two sides will seem almost alike, though the obstructed lung may seem slightly more aërated then the other), and one on full expiration (in which the obstructed lung will remain ballooned, in marked contrast to the unobstructed lung, which will have emptied itself).   (See Figs. 5 and 6.)

Obstructive emphysema and obstructive atelectasis with no shadow of an opaque foreign body present on Roentgen-ray examination are most often caused by vegetable foreign bodies, the former most often by peanuts or other kernels, the latter by beans.   Either condition may, however, be caused by a neoplasm, benign or malignant, or by a bronchial stenosis of congenital or cicatricial origin. Bronchoscopy is practically always indicated for completion of the diagnosis, and in about 90 per cent. of cases bronchoscopic treatment will effect a cure.

Foreign Body.—Though this paper is primarily concerned with disease of other than foreign-body origin, it must be emphasized that foreign body must be regarded as a diagnostic possibility for exclusion in every case of acute or chronic disease of the chest.   In another paper[15] the writer has reported several cases of bone in the lung in which the diagnosis of foreign body was made (and the foreign body removed) during a bronchoscopy requested by the referring physician for the aspiration of pus from a suppurative lesion.   (See Fig. 4.)   "Overlooked" foreign bodies[18] constitute an amazingly large percentage of the cases in the experience of a bronchoscopic clinic.

CONCLUSION

Bronchoscopy is no longer a curiosity of medicine, resorted to only in occasional cases of foreign body.   It has become an almost routine procedure as an aid to the physician and surgeon in the diagnosis and treatment of diseases of the chest.   About 90 per cent. of the bronchoscopies done today in the large bronchoscopic clinics are done for disease of other than foreign-body origin.   On the other hand, largely as the result of bronchoscopic experience, it is coming to be realized that foreign body must never be lost sight of in the diagnosis of acute and chronic chest disease.

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PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS

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IT WAS in the year 1921 that pneumothorax was first undertaken at Olive View Sanatorium and this review goes back to that time.

Pneumothorax is closely allied with nature's way in its endeavor to put the affected lung at rest, and is universally recognized as a most valuable and reliable procedure in competent hands. It has given us favorable results never before dreamed of in certain severe and rather hopeless cases and its successful as well as unsuccessful accomplishments have been undeniably the stimulus which has furthered our pursuits and advancement in the collapse surgery of the lung and the thoracic cavity of the present day.

Although inefficacious in some instances, in many others it confers definite perceptible and prolonged benefits, resulting often in permanent return to good health and ultimate recovery and cure, while making it possible to live a more natural life, with less menace to others in the same home, and the public. In cases of insufficient collapse it serves as an excellent preliminary step for further surgery, viz., thoracoplasty, phrenexeresis, pneumolysis.

Various statistical reports published from time to time will verify these facts. All who have used it to any extent can not have failed to have observed at times the dramatically sudden change for the better in the patients' clinical symptoms.

Certain points as regards standardization of the apparatus and technic should be stressed and practised by those that use this therapeutic aid. The fluoroscope should be freely used before and after treatment. The pneumothorax apparatus should be as simple as possible, with certain standards carried out. Calibration of all tubing should be as near four or five millimeters as possible and the rubber tubing heavy enough not to kink. Glass valves with a three-way cock are less likely to leak. The U tube manometer is graduated to record one centimeter every actual one-half centimeter. This gives

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a correct pressure reading, and if used by all operators would correct the variation that is apparent in different clinicians' reports on the same case. A high manometer tube will allow a continuous reading during the operation. We prefer a gold needle with a dull point on the initiating treatment; gauge twenty-one to seventeen; the smaller, the less trauma. Pleural shock has never been experienced, but air entering the pulmonary circulation has occurred four times, with acute dilatation of the left heart and fatal air embolism. This is guarded against by suction as the needle is advanced; with evidence of blood a new site is sought.

The patient is recumbent and both the patient and operator prepare as for a major surgical operation. The pressure used varies as to the object desired. Generally collapse is secured by negative pressure, never going beyond neutral or zero reading except when adhesions are to be stretched, and then it is not always necessary to use positive pressures repeatedly, and only infrequently if at all.

Extremely high pressures have been used only in the control of a hemoptysis. The mortality for the operation itself has been less than one-half of one per cent. assigned to air entering the pulmonary circulation.

Adhesions usually when feasible for pneumolysis will, in our experience, stretch and break or, as is often the case, allow of sufficient compression, that our results are good. This was observed by us prior to our having the facilities for doing a pneumolysis under the closed method. However, there arises the question of safety for the patient. Is the patient in greater danger of extension of the disease into the contra-lateral lung by the delay in securing a sufficient stretching or breaking of the adhesions to allow of a satisfactory collapse? It is admitted that such a danger may exist, yet in no instance have we felt such to have been the case. Therefore, as the exhibits will indicate, we closely follow our cases and as long as the stretching occurs and continues we do not interfere, unless immediate compression is indicated, and if such be the case other surgical means are resorted to.

One exhibit shows a large adhesion to the diaphragm which stretches and breaks from its diaphragmatic attachment and still later spontaneously amputates itself from the lung to lie on the diaphragm without any complications.

In estimating the value of compression by pneumothorax treatment, I have taken all cases in which this treatment has been advised, and compared on the one hand those that have consented to this treatment, with those that have refused pneumothorax treatment.

The fact must be borne in mind that candidates for artificial pneumothorax present already a less favorable prognosis than does the average sanatorium patient. ·

All of our cases fall into the same classification as to the minimal amount of involvement, viz., the advanced type with large cavitations of at least 3 centimeters in diameter and with little or no involvement in the contralateral lung; which type is prone to have adhesions, and for the same reason is liable more frequently to rupture.

A total of 268 cases were reviewed. Of this number there were included twenty-eight cases of spontaneous pneumothorax (spontaneous pneumothorax occurs more frequently than is appreciated) and a total of eighty-five or 31 per cent. were unsuccessful attempts at pneumothorax. The total dead in from six months to five years was ninety-five. Of this number twenty-two or less than one per cent. of all the cases and 23 per cent. of the deaths died of spontaneous pneumothorax, which was 75 per cent. of all the spontaneous pneumothorax cases. A total of 155 cases or 57 per cent. are living.

As regards results, patients are classified according to the following system and intervals:

1. Working—carrying on a vocation as a normal person;
2. Well—may be working, but enjoying good health;
3. Improved—not working but enjoying a guarded existence;
4. Stationary—general physical condition but slightly improved and continuing the cure;
5. Worse—progressing unfavorably;
6. Dead.

	Working	Well	Improved	Stationary	Worse	Dead (including spontaneous cases)
0–6 months...............					14	42
6 months to 1 year.......	4		37	5	8	30
1 year to 2 years.........	9		35	3	2	13
2 years to 3 years........	5		16	3		5
3 years to 4 years........		5	6		3	5
Total.................	18	5	94	11	27	95

FIG. 1.

CASE 3477, female, age thirty-nine. Combination of phrenic avulsion and pneumothorax on the contra-lateral side. Film November 6, 1928, prior to operation. Film July 15, 1929, showing both the result of phrenic-nerve operation on the right base, and a partial pneumothorax on the left, more at the apex where a cavity can be seen. Patient is doing very well, with exception of securing an arrest of the disease.

FIG. 2.

FIG. 3.
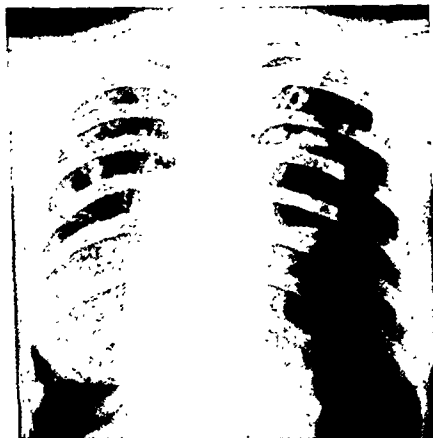
CASE 2980, female, age twenty-two. Film January 25, 1929, showing large mediastinal hernia extending almost to left thoracic wall. Phrenic nerve later removed, patient at home, doing fair.

CASE 487, A. H., female, age twenty-six, white. Film August 39, 1926, shows partial collapse an adhesion holding cavity open. This adhesion stretched sufficiently to allow control of the disease process after some months. This case was a good case for pneumolysis by the closed method, but at the time we were not equipped to do it. Patient now working part-time under supervision.

FIG. 4.
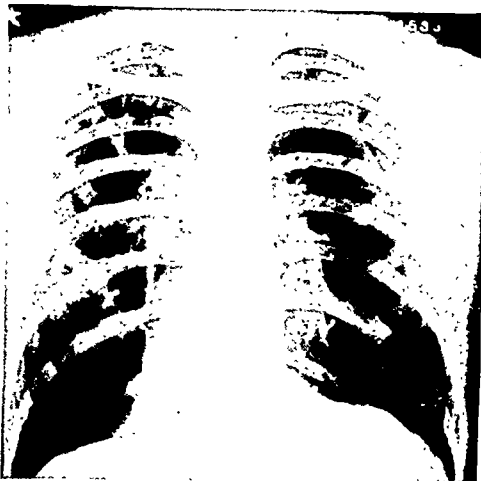
CASE 1533, W. D., male, age thirty-four. Film May 10, 1928, showing bilateral pneumothorax. At present working and receiving pneumothorax treatment on one side only.

FIG. 5.

CASE 1795, J. S., male, full-blooded Indian. Hemorrhage right lung. Film December 30, 1925. Good compression is seen in the apex; also shows division of lobes. Hemorrhage ceased, patient gained fifty pounds, discharged.

FIG. 6.

CASE 1876, L. G., female, single, Venezuelan. Pneumothorax treatments at weekly intervals for two years, induced to check hemorrhage, allowed to expand, with no evidence of any lesion; since working as a nurse. Film July 19, 1926, showing partial collapse and cavity. Film March 1, 1929. Practically no evidence of ever having had any trouble.

Fig. 7.
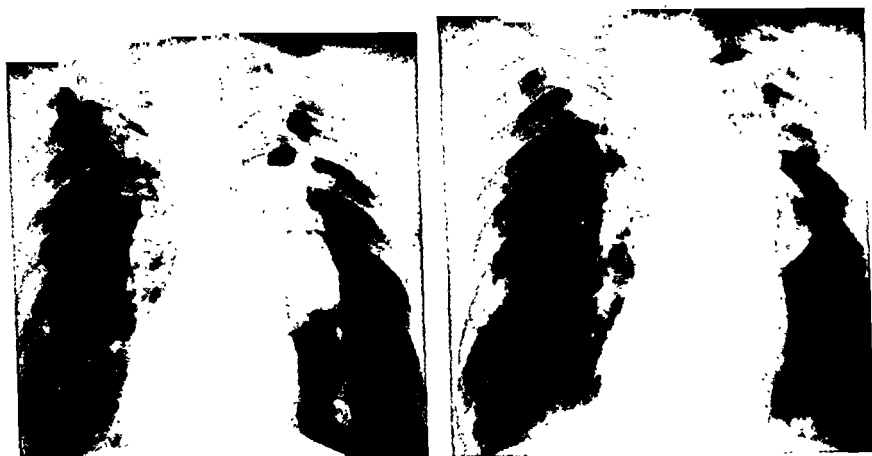
CASE 2083, male, W. D., age forty-six. Film May 17, 1928, showing adhesion which has separated at the base. Film April 11, 1929, showing adhesion on the diaphragm, where it still remains, negative readings were recorded throughout the treatment.

Of the 155 living cases, ten or 6 per cent. at present have frank empyema, several of whom were admitted with this complication from outside; twenty-nine or 18 per cent. have extensions into the contra-lateral lung, while seven or 5 per cent. have a bilateral pneumothorax, 3 per cent. of which were spontaneous.

Seventeen or 6 per cent. of the total 268 cases reviewed have had thoracoplasty after admittance to Olive View. Of the cases that underwent thoracoplasty three or 17 per cent. are dead, two dying of tuberculosis and one of cancer. Fourteen or 9 per cent. of the living 155 cases are thoracoplasties.

Out of 1,500 cases, pneumothorax was advised by X-ray in fifty-four cases, but was not done or attempted, due to failure to obtain consent, to complications, such as gastric-intestinal involvement, or involvement of the contra-lateral lung, sufficient to deter the operator.

Of the fifty-four cases, thirty-six cases were bilaterally involved, eighteen unilaterally involved. Of these bilaterally involved cases, active lesions predominated in twelve on the right side, in twenty-four on the left side; of the eighteen unilaterally involved cases eight were right-sided—ten were left-sided.

The patients who have been under sanatorium care have been classified as follows:

	Bilaterally Involved	Unilaterally Involved
Improved	14%	16%
Stationary	27%	50%
Worse	19%	6%
Dead	40%	28%

The time element in this series of cases has been classified in the following manner:

THIRTY-SIX BILATERALLY INVOLVED CASES

	Improved	Stationary	Worse	Dead
0–6 months	2	9	3	8
6 months to 1 year	1		2	
1 year to 2 years	1		2	4
2 years and over	1	1		2
Total	5	10	7	14

EIGHTEEN UNILATERALLY INVOLVED CASES

	Improved	Stationary	Worse	Dead
0–6 months................	2	5		5
6 months to 1 year.........	0	0	0	0
1 year to 2 years...........			1	
2 years and over...........	1	4		
Total..................	3	9	1	5

Of the bilaterally involved cases, eliminating those who were followed for six months or less and those who became better or remained stationary for one year or more with only sanatorium care, there are shown twelve patients or about 22 per cent. whose termination might have been different if there had been some interference such as pneumothorax treatment.

Of the unilaterally involved cases, five who remained stationary or improved for six months or more but who were never even in one instance pronounced well, might have had a better outcome had pneumothorax been instituted.

SUMMARY

1. Pneumothorax has a definite place of great value as a permanent means of securing an arrest of tuberculosis of the lungs, and checking the progressive excavation of lung tissue in many cases. It is palliative, comforting, and prolongs the life of the patient.

2. It is a decidedly advantageous procedure in whatever degree possible to obtain, preliminary to a thorocoplasty, lessening shock, distress, dyspnoea, in assuaging the fears of the patient, and is certainly useful in the control of hemorrhage both as a temporary measure or in favorable instances to be carried on indefinitely.

3. Pneumothorax can be used to decided advantage in connection with phrenexeresis on the same or on the opposite side.

4. Pneumothorax will, in our experience, in a majority of cases stretch or break adhesions sufficient to close cavities and to so give the lung sufficient rest. Pneumolysis (closed operation) is nevertheless a most valuable procedure in cutting adhesions, more particularly with the use of the coagulation current and endotherm-cutting current, securing compression of the lung that cavities may be

closed, and in cases of hemorrhages and inability to control with a pneumothorax unless the adhesions are cut.

Out of a hundred cases that are now in the process of compression there are only four that are found to be feasible for the (Jacobaeus-unverricht) operation; eight have been sufficiently compressed by the stretching of adhesions, in thirty we have been unable to compress the lung sufficiently as yet by any method. In fifty of our hundred cases the sputum has become negative.

THE CLINIC PATIENT, WITH SPECIAL REFERENCE TO DYSPEPTIC SYMPTOMS*

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THE object of this paper is to throw light on the diseases and psyche of a group of patients seen in every clinic. These patients are characterized by their numerous complaints, which are often shifting and inconstant, by the lack of physical findings or disproportion between their complaints and the objective findings, by their repeated visits, and by a striking lack of response to treatment; despite which they continue to attend the clinic, changing from one department in a clinic to another, as the predominating symptoms vary.

This study covers a group of 109 Jewish women seen at the clinic in the past two years, the group consisting of all the cases seen which were completely worked up. Eighty-five per cent. of the group were from thirty to fifty-nine years of age and therefore at the period of their maximum physical load and maximum benefit to society, *i.e.*, at the stage when they are rearing children, looking after the home, and perhaps also contributing to the finances of the family. A diagnostic summary was written into the chart after the patient had been observed for a period. It was found that the 109 cases studied had a total of 483 diagnoses, or an average of 4.4 diagnoses per patient.

Table I is a list of the most frequent of the diagnoses:

TABLE I

Cases or Per cent.

Chronic constipation, including colonic stasis, colonic spasm, redundant colon, malpositions of the colon..............	81	74
Probable cholecystitis .... 15 cases		
Definite cholecystitis .... 13 cases		
Cholelithiasis .... 9 cases		
Symptoms following gall-bladder operations .... 6 cases		
Total gall-bladder cases	43	40

Cases or Per cent.

Rectal lesions: hemorrhoids, anal papillitis, rectal stricture, cryptitis, *etc.*	30	28
Obvious dental infections	28	26
Chronic tonsillitis	36	33
Chronic arthritis and arthritic pains	41	38
Hypertension, arteriosclerosis, coronary artery disease, chronic myocarditis, chronic nephritis	32	29
Menopausal syndrome, spontaneous and surgically induced	31	28
Anxiety neurosis, psychoneurosis, psychasthenia, *etc.*	58	53

Other interesting figures: Per cent.

Diverticulosis of esophagus, duodenum and colon	5
Ulcer, duodenal and gastric	7
Appendiceal stasis, adhesions, and appendicitis	12
Carcinoma (of stomach, colon, liver and pancreas)	4
Nephrolithiasis	3
Diabetes mellitus	5
Syphilis	2

Table I does not by any means exhaust the diagnoses made on these patients. There were omitted diagnoses made by the departments of Eye, Ear, Nose and Throat, Gynecology, Dermatology, Orthopedics, *etc.*, where these departments found lesions unrelated to the major ailment of the patient.

The incidence of gall-bladder disease is very striking (40 per cent.). The figures sustain impressions we have had right along about the frequency of cholecystitis in this group. Dwyer and Blackford[1] state that cholecystitis is the most frequent cause of gastric symptoms. In a study of 3000 consecutive cases with gastrointestinal complaints in which they performed Roentgen examination, age, and sex factors disregarded, they found an incidence of 21.3 per cent. of cholecystitis.

Table II gives some pertinent data relative to these patients:

TABLE II

Age range of 109 females	26–72 years
Percentage of patients from 30–59 years	85 per cent.
Average duration of symptoms before admission	5.7 years
Average duration of management by us	9.5 months
Average number of return visits	9. visits
*Patients with gastro-intestinal operations before admission	27 per cent.
Patients with abdominal operations before admission (not on gastrointestinal tract)	12 per cent.

* A number of patients in this group had more than one operation. The figure refers to the percentage of patients who had one or more operations before admission.

Total patients with abdominal operations previous to admission.....39 per cent.
Gastro-intestinal operations performed by us.....................6 per cent.

An attempt was made to evaluate the "complaining factor," *i.e.*, the relation of the intensity of the complaints to the amount of organic disease as found after complete study. Such an estimation is obviously subject to a large element of personal bias and error, and it was found impossible to express this factor mathematically, but we feel that it is a crucial point in understanding the psyche of these patients. Most important in this regard is this: the group may be "neurotic" in that they over-complain, but this does not mean that they are organically sound. They should be judged, therefore, not by their complaints, but on their condition as revealed by painstaking examination and observation. Many symptoms are erroneously labelled as "neurotic" because the patient is sensitive to such a degree that the symptoms precede the objective findings by months.

A composite picture of one of these patients is as follows: the patient is a female in middle life. She comes to the clinic repeatedly, and has been in other clinics or has been seen by outside physicians previously. She looks worried, overworked, worn out. She has many symptoms, referable often to every organ in the body. She is very much disturbed by these symptoms, believes herself to be seriously ill, and her complaints often suggest some major organic illness. The physical examination is at gross variance from the complaints, there is no evidence of pulmonary tuberculosis nor cardiac decompensation; there are no abdominal tumors nor neurologic signs. The urine is usually normal, the Wassermann test almost invariably negative. The tentative diagnosis is "nervousness," or "neurosis," or "constipation" or "approaching menopause." On more careful work-up, including X-ray examination, the following diagnosis may be arrived at:

	Per cent.
Constipation or bowel malfunction	74
Chronic cholecystitis	40
Hemorrhoids and other rectal lesions	28
Gross dental defects	26
Chronic tonsillitis	33
Chronic arthritis	38
Hypertension and vascular disease	29
Menopausal syndrome	28
Anxiety neurosis and allied states	53

In making a multiple diagnosis, one casts about for some one unifying underlying cause for the multiple conditions. The following is purely speculative but it correlates some of the above diagnoses. There is a constitutional factor, concerning an obese person, which combined with a generally greasy diet and relatively sedentary habits, predisposes to affections of the gall-bladder. There is in addition a congenitally hypersensitive nervous system which is quite adequate for a relatively pleasant environment. However, the additional burden of such environmental factors as financial embarrassment, and internal factors, as the menopause, causes a "chronic tensional state" (August[2]). This chronic tensional state manifests itself clinically by such diagnoses as anxiety neurosis, psychasthenia, neurasthenia, *etc.* The somatic complaints are due to excessive nerve stimulation of local tissues, reflexly aroused. Increased innervation to the bowel muscle causes constipation, which may precipitate, initiate, or aggravate other gastro-intestinal conditions such as cholecystitis (by faulty emptying of the gall-bladder), appendicitis (by appendiceal stasis), and hemorrhoids (secondary to the constipation). Increased innervation to the blood-vessels of the joints causes deficient circulation with the precipitation of arthritic pains, the ground work for the arthritis already being present. Increased innervation to the blood-vessels generally may induce non-hypertensive pseudomenopausal chills and flashes, or essential hypertension, which may in turn be the basis for more severe types of vascular damage. Increased innervation *to such organs as the* thyroid or adrenal glands may, with other factors, precipitate hyperthyroidism, which can, in turn, cause other glandular derangements. The term used throughout this paragraph is "precipitate" not "cause."

The above data throw some light on the constitutional factors, or composite picture, in this type of case. But there may be, in addition, diseases individual to the particular patient presenting herself. One must be perpetually on guard in these cases not *to* ascribe all the bowel difficulties to constipation or one may, after a lapse of time, come to grief by a colleague discovering an inoperable carcinoma of the bowel; again, one may be called out some night to witness one's pet case of "neurosis" in a typical attack of gall-stone colic. The important point is that these constitutional

factors constitute a smoke screen which prevents a freshly developing disease from presenting itself with the usual clarity. This screen must be penetrated and continual vigilance exercised to detect the new disease.

The characteristics of organic disease in a neurotic person deserve attention:

1. There is wide radiation of the pains, so that the pain gets into atypical locations, confusing the clinical picture.

2. Reflex pains are aroused in organs other than the one diseased. The most prominent symptoms may be the ones aroused reflexly. The gastro-intestinal tract is a particular offender in this respect, as "there is hardly an internal disease in which, especially at the beginning of the illness, the stomach is not sympathetically concerned, or the gastro-intestinal symptoms do not stand in the foreground" (Kuttner[3]). For example, where kidney stones give rise to gastro-intestinal symptoms, and thorough investigation of the gastro-intestinal tract reveals no organic lesions, one may conclude that all the complaints are functional in nature, overlooking the kidney stones. For this reason a complete study of these patients, often with the aid of special methods of diagnosis, is essential.

3. It is often difficult to decide if the neurosis underlies the organic disease, or *vice versa*. "In thyrotoxicosis it is often difficult to decide if an anxiety has brought on the hyperthyroidism, or if each is independent of the other" (Deutsch[4]). One of our cases of gall-bladder disease in a very neurotic woman had attacks in which it was at times impossible to state whether the attacks were biliary or psychogenic in origin. These cases swing between neurosis and organic illness, each aggravating the symptoms from the other.

4. Information as to whether the symptoms are related to nervous tension is apt to be distinctly misleading. The so-called characteristics of nervous disease, *i.e.*, the presence of general nervous complaints, increase of complaints with aggravation or excitement, relief of complaints with removal of irritation, *etc.*, do not exclude organic disease of the organ involved. A classical example of this is John Hunter's description of his own attacks of angina pectoris, in which he stated that he was at the mercy of any student who wished to irritate him. Similarly it is well known that in duodenal ulcer an exacerbation can be initiated by mental strain.

"If one starts with the assumption that a pure nervous lesion is present, one too easily reassures himself, to the damage of the patient and the chagrin of the physician. The diagnosis of neurosis is not made by positive characteristics, but purely by exclusion" (Kuttner[3]).

5. The reëxamination of these cases after the lapse of an interval is necessary. These patients are abnormally sensitive, and may have begun to complain very early in the illness, even before objective findings were present.

Table III is a summary of the results from treatment.

TABLE III

	Cases	Per cent.
No return visits	8	7
Unimproved	42	38
Worse	2	2
Died	7	6
Slightly or moderately improved	24	22
Greatly improved	24	22
Cured	2	2

The therapeutic results are particularly discouraging when viewed mathematically, although this is at distinct variance from the impression one usually carries away with him after leaving each clinic session. The cases listed as unimproved had psychic disturbances so marked that they were being treated in the psychiatric department, or such illnesses as diabetes mellitus, or cholelithiasis for which operation was refused. The group listed as moderately improved include functional disturbance of the colon, and also cases of cholecystitis who were improved by medical management. This cholecystitis group undoubtedly includes a number in whom the improvement is temporary. The two cured cases had subacute recurring appendicitis, both being surgical cures. There were no medical cures.

In searching for the cause for this striking lack of response from what we think was adequate medical management, with modern facilities available, the following facts must be taken into account: the chronicity of the diseases, the average duration of symptoms before coming to us being 5.7 years; the type of the disease, such conditions as duodenal ulcer, appendicitis, *etc.*, where one would expect good results from therapy, being distinctly in the minority;

the refusal of some of the patients to submit to operations such as cholecystectomy, hemorrhoidectomy, *etc.*; inability of a patient to eat or rest properly due to the family social situation; the psychasthenic background of these patients.

One might take the point-of-view that many of the diseases listed are subject to surgical treatment. We doubt that the wholesale removal of teeth, tonsils, appendices, and gall-bladders in these patients would cause any striking improvement. Operation, though indicated in individual cases, must be advised only after definite indications are presented, and the query must be continually in mind: "Will this operation cure the patient of her complaints?" Often we get these patients after ill-advised surgery elsewhere. Perhaps one way to regard these patients is in a fashion analogous to that of the garage man when an old automobile is brought in for repairs. The obvious difficulties are remedied first. This done, one is confronted by a used car, no amount of work to which will make it as good as new. All the parts are worn to some extent, and a major operation on the motor will not remedy a worn transmission. The removal of a pair of diseased tonsils, or even of the gall-bladder is no guarantee that the patient will be cured. "The failure of surgery in a particular case may be due to the fact that it is undertaken at a time when the nervous instability of the menopause might well have suggested the advisability of caution" (Cabot[5]).

Medical treatment in addition to the specific care of particular diseases includes reassurance as far as possible. We do what we can to encourage the patient and assure her that her condition is not serious or progressive. It is much easier for the patient to bear her illness if she can be given a definite diagnosis, for instance, of gall-bladder disease, by which she can rationalize her symptoms instead of being mystified, and therefore frightened by them. It is easier for her to bear her illness if she knows that her neighbor has had gall-bladder disease for years, and is still in tolerable health; if she knows that her illness is not fatal; if she is certain that it is not cancer. With this knowledge she may disregard her pains.

The removal of irritating environmental factors may take enough load off the patient to enable her to compensate and become relatively symptom-free. These patients may date the discontinuance of their visits to the clinic to the return of a husband to work, or

to the recovery of a sick child. Many of these people have bitten off more than they can chew, and are limping financially because they are ambitious that one of the children who could be a wage earner be kept in school.

The cost of this diagnostic work to the community, considering the striking lack of results, is great. With the used car we often decide "to get a new one." Exactly this point of view is held by certain of the social agencies when tremendous amounts of money are spent in fresh-air camps for children, Y's, children's funds, *etc.* However, no justification for the expenditure of community funds on the adults is necessary; these patients are with us and the community cannot side-step or disregard them. It is less costly in the long run to give them a definite diagnosis and rational therapy than for them to wander from clinic to clinic, where there is useless duplication of X-ray and laboratory work, all to no end. Progress in the treatment of these cases is not only medical, but lies in the domain of social service as well.

The above remarks are applicable to private patients as well as clinic patients. The clinic patients are striving for bread and butter. The patients whom we see in our offices may be beyond that stage, they may be striving for education, social position, leadership in business or professional fields; they may take the struggle to heart just as seriously as the clinic patients regard their struggle for bread and butter, and thus develop the complaints described above. The incidence in private practice is not as great, but occurs frequently enough. One of us had occasion to see a typical reaction of this type in a woman whose budget would not balance because her daughter had to be provided with an education in art. The remarks above do not apply exclusively to any particular race, social status, age or sex.

CONCLUSIONS

Many of our clinic patients have serious organic illnesses. These illnesses are harder to diagnose than in a more stable type of patient. The disease is often masked, the complaints atypical, widely radiating, misleading. These patients, because they are abnormally sensitive, often present themselves before the disease has reached the clinical horizon.

A study of 109 women is presented. They average 4.4 diagnoses per patient. The most frequent diagnoses are: chronic constipation and allied states, chronic cholecystitis, hemorrhoids, gross dental defects, chronic tonsillitis, hypertension and vascular disease, menopausal syndrome, chronic arthritis, anxiety neurosis and allied states.

An attempt is made to draw a composite picture of such an individual to throw some light on constitutional factors.

Some characteristics of organic disease in neurotic persons are pointed out.

Suggestions are made as to prognosis and treatment in this type of individual.

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THE NON-HEREDITY OF DISEASE

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THE movement that is most worthy of attention in medicine
during the generation that we are part of (that is, let us say, since
1890, to make it a rounded forty years), is constituted by the strong
tendency away from the notion of the heredity of disease, which is
found among physicians who are trying sincerely to get the proof
for the opinions they hold. A generation or a little more ago
heredity was supposed to play a large rôle in the matter of disease
diffusion and etiology. A great many people among not only the
less cultivated classes but also the intellectually developed were so
sure that diseases of all kinds ran in families and that children could
scarcely be expected to avoid them or recover from them once they
got a foothold. This present generation would scarcely believe the
extent to which the persuasion with regard to heredity in disease
went even less than forty years ago. Rheumatism, heart and
kidney disease, lung disease, and also stomach and intestinal dis-
eases were supposed to be the subjects of inheritance.

For instance, even thirty years ago it was not at all uncommon
to have a man walk into a doctor's office and say something like
"I can remember that as my father got older we had
complaints from him of being ever less 'soople' (supple) in his
joints. Gradually they became a sort of barometer for the
the weather. I remember that he used to complain
and he had to lift himself up by his arms. His walk
After awhile his joints became tender as well as sore
and his doctor told him that he suffered from rheumatism
never actually crippled, but all of us children
rheumatism bothered him a good deal and tried
fortable for him. I am beginning to feel it
joints are sore, my muscles ache, so I suppose
rheumatism just as my father did, and that it is
an inheritance and grin and bear it. I

able to do much for me but I thought I would tell you the whole story."

At that time the uric-acid theory of the etiology of rheumatism, that is, that the joint irritation and inflammation were due to an accumulation of uric acid in the system, was very generally accepted. Haig's effusions on the subject were widely read. There was nothing in it though acidosis in some form as the etiology of joint troubles keeps coming back. Heredity was supposed to be mixed up in it. I recall Haig's discomfiture as an old man at the International Medical Congress in London (1913), when, with Osler in the chair of the Medical Session, he was thoroughly discredited.

As a matter of fact, rheumatism was supposed to run in families somewhat as gout used to be said to run in families in England. People had the feeling that they just had to grin and bear either disease since they had it by heredity and that was all there was about it. Almost needless to say, there is no inheritance of rheumatism, though stiff joints come to all of us as we grow older. Even the supposed inheritance factor in gout is very much less insisted on now than it used to be. Most men have earned their gout rather than inherited it. We know now that gout is due to two causes more than to any others. The one is the taking of strong malt liquors heavy with alcohol—8 or 9 per cent. or more—and the other is lead poisoning. Gout has been very much reduced in frequency in recent years and the hereditary elements in it are extremely dubious, though some physicians still cling to that thought and are persuaded that gout runs in certain of the old families somewhat as blue blood used to be supposed to.

Almost needless to say, the men were not the only patients with an heredity complex, to use the fashionable term. The women were even more affected by it. Occasionally a woman patient would come into a physician and say, "I have had a good deal of trouble with my stomach lately and I think I must be suffering from dyspepsia. I remember that my mother as she grew older complained very much of her stomach, though she died of pneumonia, and I suppose that I inherit her stomach and will have to go through the same sort of troubles that she went through."

Almost needless to say, indigestion, or dyspepsia as it used to be called in the long ago, is practically always due to abuse of the

stomach in some way. This is usually supposed to be from over-eating, but I have seen much more indigestion, that is, such symptoms from the stomach as gassy eructations with a bitter and sometimes an acid taste in the mouth, with a sense of fulness and discomfort, sometimes with the uncomfortable feeling known as "heart-burn" as the result of eating too little rather than too much. Those who overeat suffer from kidney and liver disease but not often from stomach disease. The old-fashioned woman patient, however, was quite convinced that her stomach trouble was hereditary and she was quite persuaded that very little could be done for it but she would be glad if some relief could be afforded, though she could scarcely expect the doctor to cure the disease since after all it was a family matter and one of the things that would have to be borne with as a result of being one of the family. They were often rather complacent over their hereditary failings, as if they represented a sort of distinction.

About 1890, Weismann, the distinguished German biologist, revolutionized all our ideas of heredity by pointing out that "acquired characters are never inherited," that is to say, that any change that takes place in the persons of parents during their lives does not affect the germ cells and therefore children are born without any influence being exerted upon them by defects or diseases acquired by their parents. For instance, if a father loses a finger when he is a boy and marries fifteen or twenty years later, his children will not be born with a finger missing though naturally he remains without that finger for the rest of his life. Every one knew this and yet did not apply the principle that evidently underlies it to other things, but that principle regulates heredity both bodily and mentally.

Oliver Wendell Holmes suggested that Emerson as the seventh generation of an academic family might very well have been expected to display talents of a high order. By this time, as it were, culture had become ingrained in the very backbone of the family and some influence of it at least was transmitted. I need scarcely say, however, that even though one's father and mother and grandfather and grandmother for a dozen of generations could talk Greek, that does not make it easy for the children to learn Greek, and the same thing is true for all other studies. Acquired characters are not trans-

mitted and our children must start with the abc's and learn what they can for themselves.

TUBERCULOSIS

About the time that Weismann made his declaration that acquired characters are not inherited, the battle with regard to the heredity of tuberculosis was just being waged. In the early '80's, Koch, a country doctor in Germany, discovered the microbic cause of tuberculosis. It was the tubercle bacillus. At that time the great majority of doctors throughout the world were extremely dubious as to the microbic theory of the causation of disease, and only a very few of them were at all convinced of the significance of microbes in the etiology of disease. It took much longer to get physicians to accept that theory than this rising generation would be at all willing to believe. It seems so obvious to us now that doubt about it less than fifty years ago seems almost absurd.

When Koch announced his discovery of the tubercle bacillus as the cause of consumption, a great many physicians, some of whom I knew and respected for their candor and sincerity, argued that this announcement was the strongest possible argument against the microbic theory of disease, for, they said, "Every one knows that tuberculosis is hereditary and here is a man who would suggest that it is a bacillus that causes it and that perhaps the disease is contagious, which everybody knows is not true." Most of these men carried that persuasion to the end of their lives, and it was only the succeeding generation of doctors who accepted wholeheartedly the microbic theory of disease.

After a time there came to be no doubt that Koch was right and that tuberculosis was not inherited but might very readily be acquired in case of negligence in association with tuberculous patients. Doctor Flick, in Philadelphia, pointed out that certain houses in the tenement districts might well be called consumptive in the sense that succeeding families unrelated to each other who moved into these tenements who had hitherto not suffered from tuberculosis, had members die of the disease. After his demonstration there was no doubt that the houses carried the disease from one family to another and infected weaklings in the incoming family.

INHERITED TENDENCY TO TUBERCULOSIS

When it came to be generally recognized that tuberculosis was not hereditary, a great many physicians felt that they could not give up entirely the idea of heredity which had been a rock of truth to them a few years before, as they clung to the thought that at least the tendency to the disease might be inherited. After a certain amount of experience a good deal of communication on this subject and wide reading, I am myself convinced that there is no tendency to tuberculosis in families. In my experience what runs in families is a tendency to eat too little or not to eat raw things or to eliminate to a great extent milk and eggs from the diet and families who make such dietary mistakes have a very definite tendency to contract tuberculosis if they are brought in contact with the germ in any way. Almost needless to say, all this represents the influence of environment and not at all of heredity. Lessened immunity to the disease is probably not a matter of inheritance.

What was extremely unfortunate was that the persuasion that tuberculosis was hereditary engendered the very worst kind of attitude of mind for tuberculous patients to have. Many of the experts in tuberculosis do not hesitate to declare, "Tuberculosis takes only the quitters," that is, only those die of tuberculosis who have not the strength of will to do what they are told, to eat whether they care for food or not, to take milk and eggs though most of their lives they may have been away from them, to eat bacon in the morning because it is good for them whether they like it or not, and then to follow the régime with regard to air and sleep and all the rest that will prove beneficial to them.

When young folks acquired tuberculosis in the past generation, however, and recalled that a brother or a sister died of it or was actually a sufferer from it, or that perhaps a father or a mother or an uncle or an aunt had had the disease, they felt, "Oh, it's hereditary, it runs in our family, I cannot hope to oppose it successfully," and then would give up hope or nearly so, and that would be the end of them. They signed their own death warrant by this conviction. Only those who maintained hope and faced the disease bravely survived, though even in the older days there were many who had the stamina to face the worst without discouragement or despair.

In recent years ever so many more are. persuaded to take this new attitude of mind and as a result conquer the disease or at least keep it from seriously shortening their lives.

The belief in heredity undoubtedly was the most important factor in shortening the lives of many thousands of young tuberculous patients who might have lived many more years, many of them not as a burden to themselves or to others, but as quite useful members of society. It is easy to understand then that it is extremely important that we should not repeat that mistake and discourage patients by any hint of heredity unless we are absolutely sure. Since giving up the idea of the heredity of tuberculosis, with the institution of proper measures in connection with the hopeful attitude of mind, the death rate from tuberculosis has been reduced by no less than 56 per cent.

EPILEPSY

There still remains the bogy of heredity in the minds of a great many people for certain other affections with regard to which we are not quite sure whether the hereditary factor has anything like the influence that it is said to exert. Take, for instance, epilepsy. Most people and a great many physicians—I think by far the greater majority of them—are persuaded that there is very often an hereditary element of some kind in epilepsy. We know the cases of Jacksonian epilepsy which are due to injuries, but idiopathic epilepsy seems surely to have for many people an hereditary factor in it.

Almost needless to say, the experience of the ordinary practitioner of medicine with regard to epilepsy scarcely gives him any right to an opinion with regard to this question of heredity in disease, because his statistics are not large enough. The statistics of the State colonies for epilepsy, however, in which there are thousands of patients constantly under supervision, ought to be able to make this subject reasonably clear. There is practical agreement among them that epilepsy is not hereditary but is due almost without exception to incidents that happen after conception rather than before.

This expression may need a word of explanation for those not accustomed to the discussion of heredity but what the physicians

meant was that after a child begins its growth in the womb, mother may suffer from rather serious conditions that will disturb the proper development of the embryo. For instance, she may have an attack of typhoid fever and survive, though that is very rare, but in that case her child will almost surely be mentally inferior in some way as a result of the critical vital condition to which it was subject at this impressionable period. Mother may suffer from paratyphoid fever or from dysentery and recover completely and the result may be that the child will be marked physically or mentally in some way though not so profoundly as with severer diseases. Mothers have been known to go through rather serious attacks of malaria or sometimes even of yellow fever while carrying children and yet survive and carry their children to term. In such cases epilepsy may develop in the child years after its birth as the result of the disturbance of its nerve centers in the developmental period.

Mothers may, however, suffer from accidents themselves or they may suffer from worries in times of hardship such as during war or in famine or even hard times, or they may be very seriously disturbed by having their husbands brought in dead to them, or by having near relatives severely injured in auto accidents. In the families of the poor, father may lose his job in time of stress and the family not have enough to eat. Mothers even when carrying children will sometimes deny themselves and feed their other children at the expense of their own tissues and of the child that they are carrying. Mother may be badly scared by a burglar or by the death of a preceding child may be brought to deep grief. All of these things may prove physically extremely disturbing and such pre-natal histories are often found in the case of epileptic children. If mother went through a serious experience during her pregnancy, then the child may suffer from it, though fortunately many of them do not suffer seriously, but a few are epileptic.

Is epilepsy due to inheritance then? Not if it develops as the result of the factors we have been discussing, for that is an unfavorable environment during its embryonic life and not at all due to any defect of the germ plasm. It is true that this way of looking at epilepsy does not make our power to treat the disease any greater, but it will encourage many epileptics to face their very disturbing pathological condition with better courage, for the question of the

family influence in its production will be eradicated and they will feel more capable of bearing up under the disease and enduring the symptoms.

<div align="center">FEEBLEMINDEDNESS</div>

After epilepsy comes feeblemindedness. We have heard so much of feeblemindedness running in families and of sterilization to prevent it, that it is well to remind ourselves and the public that a great many cases of this unfortunate mentally defective condition occur in the children of parents who are physically and intellectually quite normal. Indeed, it is said as the result of rather careful research that about 50 per cent. of the feebleminded come from families considered above the average in intelligence. Sometimes both father and mother have been teachers and rather leaders in their profession than among the tail-enders. Doctor McCann, president of the League of National Life, England, in an address delivered at the International Conference for Life and the Family, in Paris, in 1928, said: "I have seen in my own practice achondroplastic dwarfs born of parents in apparently perfect health and who begot other strong and healthy children." It might seem that parents who had already demonstrated the possibility of their reproduction of backward, deformed or feebleminded children should be sterilized lest they should give birth to others of the same kind, but of course that is entirely out of the question and the unfortunate children are only products of accidental circumstances and heredity has nothing to do with them. Doctor McCann says, further, that "In one instance the father of one of these defective children was a noted athlete and the mother a picture of virile motherhood." This London physician has gone into the subject rather carefully and he says, "It is stated that more than one-half of the mentally deficient are born of parents who are not mentally deficient."

Something over 30 per cent. of the feebleminded are first-born children. We have already indicated the danger there is for the occurrence of feeblemindedness in these first children, especially if mother's marriage is delayed as is only too often the case in these days until she is thirty-five years of age or sometimes even older. The pressure produced on the cortex of the infant during a birth passage that lasts twenty-four hours or more may very readily pro-

duce serious effects upon the cells of the infant cortex. That feeble-mindedness or some disturbance of intelligence should follow on this is not surprising. Is backwardness in children hereditary then? It may be in some cases, but the answer to that question is much more dubious than most people seem to think. If we were to listen to many who declare that feeblemindedness would surely be eradicated by sterilization of the unfit, the whole problem would seem to be one of heredity but of course it is not and there are many other elements in it.

As a result of insistent propaganda with regard to heredity of feeblemindedness, we already have a set of laws in a number of states requiring the sterilization of the unfit under certain circumstances. Professor Hirschberg, of Berlin, who has been in this country lectur-ing during the last quarter of 1930, declared that the European countries were not yet ready to pass any such legislation because they did not think that it was justified by our present knowledge in the matter. They are perfectly willing, however, to let us try the experiment over here and see what will come of it, though, almost needless to say, many European medical authorities are quite con-vinced that no good can come of it.

There is one variety of feeblemindedness that is noted as occur-ring with special frequency in families where both parents are of good intellectual capacity. These are the so-called Mongolian idiots. They have the slant eyes of the orientals, they have somewhat promi-nent cheekbones as a rule and they have a very high palate. It has been suggested that the height of the palate encroaches somewhat on the brain space and that this may be one cause for the feebleminded-ness. Almost needless to say, this is rather dubious. These Mon-golian idiots are comparatively so common that a rather well-known physician in England wrote a book on what he called "The Mongol in Our Midst," because he felt that there was a real danger to our civilization from the occurrence of these Mongolian idiots among our population in a definite proportion which he at least was inclined to think was on the increase. His ideas may be exaggerated and somewhat far-fetched, but at least it will be understood that his book would not have been written only that we have a real problem in the Mongolian idiot.

He expressed the opinion that certain races, especially among the

more primitive people, though also among the more highly developed, were not liable to have these Mongolian idiots occur among them. He said, for instance, that the Mongolian idiots did not occur among the Negroes. That was only due to his lack of observation of sufficient material. Dr. Max Schlapp, who was closely in touch with the problem of the feebleminded here in New York, pointed out that he had seen a number of Mongolian idiots among pure Negro stock in New York City. After all, it must not be forgotten that New York is the largest Negro city in the world with a population of over a quarter of a million, so that we have a better opportunity to judge of Negro peculiarities here than any other place in the world.

The English physician also suggested that Mongolian idiots were not seen among the Jews at the other end of the scale of intelligence, but with regard to this also Doctor Schlapp intervened and as with regard to the Negroes presented a series of pictures and case histories which showed very clearly that the Mongolian idiot is not at all a rarity among the Jews. He had more extensive material to study than they have even in London for we have the largest Jewish population in the world in New York.

Doctor Schlapp pointed out particularly that in practically all of these cases the history of the mother during pregnancy showed that she had suffered from some infection or from serious prolonged worry or profound anxiety or perhaps from almost starvation and that it was these accidental conditions in her environment and not at all any hereditary element in her makeup or that of her husband which brought about the birth of the defective child. Many Jewish families who were recent arrivals in this country had gone through pogroms or other exhausting unfavorable conditions in Europe just before emigrating and the first-born child in this country would be seriously defective as a consequence though none of the subsequent children born under happier conditions over here in America would have anything the matter with them either physically or intellectually.

Over in France the Society for the Prevention of Alcoholism has pointed out one source of feeblemindedness that is very interesting. In the fall of the year the grapes are gathered and in many parts of the country there is a sort of harvest festival extending over

several weeks. The grapes in some situations in the same region ripen sooner than in others and need to be gathered at their ripest to get the best results in wine. The employees of any one vineyard would not be sufficient to gather all the grapes and use them up in wine-making just at the most appropriate time, so, as nature has fortunately provided what may be called a staggered ripening of the grapes, the people from a group of villages gather in each of them just at the time when the grapes are at their ripest and see that the grape juice is started on the way to becoming wine at just the most favorable moment.

When these groups gather, there are feasts and dances prepared for them in the evening and the wine of the preceding year flows freely and a good deal of brandy—that is, strong liquor made from grapes—is available for those who care to have it. The consequence is a good deal of drunkenness on the part of both women and men. The results of this are seen some nine months later when the children conceived at the time are born. Three or four times as many idiots and feebleminded children or at least of those backward in intelligence are born as the result of these orgies as at other times in the year.

It has often been noted that if parents are drunk when children are conceived, there is likely to be lowered intelligence in the offspring. This is particularly true if both father and mother are in that state and particularly if for some days they have been so under the influence of liquor as to make it clear that their tissues are all pretty well soaked with it. This is not a matter of heredity but of the external environment of the germ cells. It would not be surprising that weakness of character should be transmitted under these circumstances and that as a result these children when they grow up might very well not have the strength of will to resist temptations to the taking of strong liquor whenever they were worried or anxious or in any way disturbed about conditions around them. Alcohol is, of course, not a stimulant but a narcotic. It does not raise blood-pressure but lowers it. It acts much more on the mind than it does on the body. It gives people a tendency to euphoria or a sense of well being and makes one forget worries and anxieties and duties and the necessity for their performance and often adds an illusory sense of power which does not really exist. It affords an

escape from the dreads of existence, was evidently intended for this purpose in the order of nature, but like ever so many other of the good things of life may be abused and may become an evil rather than a good.

Three-quarters of a century ago it was the custom to suggest that inebriety, meaning by that the tendency to take strong alcoholic liquor to excess, was considered to be hereditary or at least in some way the subject of inheritance. It was pointed out that where father drank to excess, one or more of his sons were almost sure to follow his example, but this was considered to be due not to environment so much as to the definite inherited craving of the tissues for alcoholic stimulation. I think there is scarcely any one who would accept that idea at the present time but it was a very commonly accepted notion even in my younger years. It is recognized now that the incidence of inebriety in succeeding generations was due to conditions of environment and the bad example set and the ease with which liquor could be obtained, for where father drank freely, whisky or other strong liquors were likely to be around the house at all times and so the acquisition of habits with regard to them was comparatively easy. If there was a certain flabbiness of character due to physical conditions, defective tone as it were, in succeeding generations, then the formation of habits in the matter of excess of alcohol was comparatively easy. When both father and mother drank to excess, the inheritance of tendencies to inebriety was supposed to be almost inevitable and even to affect the distaff side of the family as well as the male.

One result of this persuasion with regard to the heredity of the tendency to inebriety was that sons and daughters were somehow supposed to be skipped in the matter, sometimes considered themselves more or less doomed to inherit the family tendency and therefore put up no consistent resistance in the matter. They became thoroughly convinced that they could not help it, they were born with the craving and they had to satisfy it. I have known one case at least where a boy was warned so much with regard to the possibility of his having his father's tendency in the matter that it became a sort of obsession and he actually took to drink as a consequence

of it. His father died a drunkard's death when he was a boy of four or five. Liquor had faithfully been kept away from him in home life until he was sixteen. He then had to go to college where his father had gone and his mother wept over him and told him that she hoped his father's craving would not spoil his life. At her request the minister of their church warned him and told him of the weakness of character in that matter which he had probably inherited. His uncle, his father's elder brother, pleaded with him to be strong where his father had been weak, and an elder sister who had been old enough to appreciate something of the misery that father brought down upon the family besought him tearfully never to touch it.

He went away to college so full of the idea that he was born with a craving for liquor ready to manifest itself at any moment, that in his second year at college, for during his freshman year he had faithfully avoided liquor in any form, he began to wonder if all this was not exaggerated and he tried liquor and rather liked it and after a while came under its influence rather strongly. In his junior year he was expelled from college for drunkenness. For the next three or four years he lost position after position as a result of his indulgence in liquor. Then he pulled himself together and decided that he had no such craving as had been described to him, and that it was only suggested at the beginning and now liquor, as a mode of escape from his despondency over his own foolishness, led him to go on. He decided not to take liquor and for twenty years has never touched it. He has always been quite sure that he could control himself in the matter.

A number of people have been made weaklings by this persuasion of the inheritance of the tendency to inebriety and a supposed craving that is transmitted from father or son, or sometimes even from father to daughter. Mothers who drank were supposed to be particularly likely to transmit the misfortune. There is really nothing in it in spite of all that has been said. The present generation has given up all thought of it.

INSANITY

The most important question in heredity left with us now is as to the heredity of insanity. For many years there was a very defi-

nite impression existing not only popularly but also among physicians that insanity was hereditary, that it ran in certain families. Only during the last twenty years or so has serious doubt been thrown upon that. The impression that insanity is hereditary was no more deeply graven on minds generally than that which we had with regard to tuberculosis some fifty years ago. For any one to doubt at that time that tuberculosis was not hereditary, that consumption did not run in families, would have laid the holder of the doubt open to the suspicion of refusing to see things as they actually were. Every one with eyes to see must recognize that one brother or sister after another developed tuberculosis and died of it or were very seriously crippled by it and their lives shortened. To marry into what was considered a consumptive family was looked upon as taking a very serious risk. The disease was not considered to be at all contagious but the children were almost sure to develop it and therefore there was unhappiness ahead for the family. This was, as in the case of insanity now, not only a popular but a definite medical opinion. Family doctors insisted that the young folks must not marry with members of those families which had tuberculosis and there was even question whether marriage was not extremely inadvisable if the proposed consort was related rather distantly to any one who had tuberculosis.

Grave doubts with regard to the influence of heredity in insanity have been coming into people's minds in recent years. A friend of mine who has been for many years a physician at various State hospitals for the insane, for they are no longer called asylums in New York State, wrote me in answer to my question on the subject: "Possibly my own unconscious influences my opinion and I may be rationalizing, but as near as I can recall from my own personal contact and investigations of thousands of mentally ill patients, I have not seen more than the number that could be counted by the fingers wherein hereditary influences seemed to be the determining factor for the development of such illnesses. Practically all my cases could be readily explained by the unhealthy personality tendencies and the conditioning forces as brought out in the life history. In other words, it is an affair of the individual and not of the stock."

That this is not a personal opinion but is shared by practically

all the physicians to State hospitals for the insane, can be best appreciated from the fact that since 1907 the New York State Commission of Lunacy has not thought it worthwhile to investigate the question of hereditary predisposition in the patients admitted to the various hospitals. They found that there was something like a family history of insanity more or less distant in something less than one-third of the cases. There were so many sources of inaccuracies in this investigation that it was not thought worthwhile to continue these studies after 1907.

Even as long as thirty-five years ago, Koller compared a series of 370 persons who had never suffered from mental disease with an equal number who had suffered from psychoses. Hereditary taint in the family was traceable in a little over 75 per cent. of the persons suffering from psychoses, but a corresponding history could be obtained in nearly 60 per cent. of those who had never suffered from the psychoses.

Henderson and Gillespie in their volume on Psychiatry, a recent publication, discussed the etiology of mental diseases and devoted considerable space to the question of heredity in these cases. They say quite emphatically that "Too much stress has been laid on the rôle of heredity in mental disorders. . . . The unvarnished truth is that very little even of what is probable is known of the inheritance of mental instability and almost nothing is firmly established." Singer in Nelson's Medicine notes that "It is questionable whether we have yet sufficient knowledge of heredity to enable us accurately to interpret these statistics."

He emphasizes very properly the fact that a parent who has any tendency to psychosis will almost inevitably train the child in faulty methods of behavior and hence produce in it a greater liability to mental disorder. It is easy to understand that in these circumstances, as my friend, Doctor Kelleher, of the Hudson River State Hospital, Poughkeepsie, to whom I am indebted for much of this discussion of the place of heredity, said: "Instead of inheriting the psychosis, a person may thus be trained for it."

Insanity is not nearly so much a question of heredity so far as any present-day authority on the subject is concerned, as is the individuality of the patient. Life experience is the essential factor in determining mental illness. As Doctor Kelleher says: "It is

almost impossible to define insanity from the medical standpoint, and the terms mental disorder, mental illnesses, emotional defect and odd ideation and the so-called 'normal' are so relative that statistics must, of necessity, be not altogether dependable. We know that thousands of people who on the surface appear quite normal are really much troubled by various obsessional ideas, compulsions, and phobias. We see many patients whom we know to be delusional who are able to keep under cover their delusional formation. On the other hand, we see great brilliance in many persons of authority and influence who might be interpreted as having mental twists or peculiarities or what we often refer to as psychopathic traits; therefore, insanity might be interpreted simply as a quantitative reaction referring mainly to the more marked degree of social maladjustment."

BALDNESS

A number of people, including a good many physicians, are quite sure that baldness is hereditary. There is no doubt at all that baldness runs in families though it never affects the females of the family. Fathers and sons, however, are often so similarly bald that if there is only twenty years or so between them and father has an air of youthfulness and his son of maturity, it is sometimes hard to tell them apart or to think of them as anything but brothers. Baldness is, therefore, often spoken of as an hereditary quality that passes down through the female side of the family somewhat like hemophilia but affects only the males.

Baldness is, however, a disease. It is due to the effect upon the hair follicles of microbes which grow and gradually bring about the eradication of the function of the hair follicles. It is not an inherited disease, however, but as in the case of tuberculosis a contagious disease which may be communicated from father to son if they use the same comb or brush or even towel. The reason for the baldness running in the family, however, is more particularly because head shapes are inherited very often from father to son and it is the shape of the head that counts in baldness.

The reason why men get bald while women do not is because the men have the habit of pulling their hats tightly down over their heads in order to keep them from blowing away. This gives a con-

striction band around the head which presses the blood-vessels of the scalp back against the skull and shuts off or distinctly limits the circulation. Circulation of the scalp, I need scarcely say, does not come from within the skull but runs up along the outside of the head and may thus be rather readily shut off or greatly hampered. Owing to the limitation of the scalp circulation, the microbes that cause baldness meet with very little resistance, hence the gradual destruction of the function of the hair follicles and the loss of hair and its failure to grow again.

The proof that this is the reason for baldness is found in the fact that baldness begins almost without exception just above the three parts of the head that are most prominent. These are the forehead bosses in front and the prominence at the back of the head, commonly spoken of as the occiput. It is at these points particularly that the tight hat presses on the blood-vessels and impedes the circulation. It is just above these place that the microbes of baldness grow more luxuriantly and so the bald spots appear.

What is inherited is the shape of the head. Head shapes, I need scarcely say, are very individual. Bald heads reveal some striking peculiarities in the conformation of the skull, but there is as much similarity between the head shapes of father and son very often even to minute details as there is between their features. Baldness is not hereditary but acquired, and acquired characters are not inherited, though the relationship between father and son is responsible for it. The head shape which predisposes to baldness if a tight hat is worn is inherited. If there are prominent bosses at each side above the forehead and a prominent occiput, then baldness comes rather easily. Orientals who wear no tight hat but only turbans or burnous do not get bald even though they have the head bosses that usually go with baldness. The American Indian brave has no more tendency to be bald than his squaw if he does not take to wearing a tight hat.

Our own women will begin to exhibit the tendency to go bald if they continue to wear the tight, non-porous hats which are now fashionable. The lack of ventilation for the hair is almost as important for the encouragement of the growth of the microbes which cause baldness as is the tightness of the hat. Fortunately, our women as a rule do not have a constriction band in their hats. This

can exert really occlusive pressure if it is pulled down tight over the head.

On the other hand, early grayness of the hair is a family trait just as the color of the hair in general is. It follows a Mendelian law from blonde through red to brown and black. Pigment of the skin and the hair is much deeper than the superficial thing it seems to be. Pigmentary processes of various kinds have a rather definite constitutional element in them. Blonde women, and especially those with very light hair and skin, are much more prone to suffer from pigmentary sarcoma, an extremely fatal disease, than are brunettes. White horses develop this lesion with special frequency. It is not surprising, then, to find that in certain families early grayness, or sometimes even whiteness, of the hair occurs in the early twenties or thirties. Certain family names are dependent on this. Horan in Irish means gray, and I have known a whole family of Horans who for generations developed early gray hair. Our English family name of Grey or Gray is in many cases consequent upon this family trait. Here is a pigmentary defect that is the subject of inheritance, while baldness, which is a disease, is not inherited though the head shape which leads up to it is the subject of inheritance.

Offspring often resemble parents so much and with regard to nearly all of them there are such haunting resemblances, that it is easy to understand the great temptation there has been for men to assume that there must be something in the heredity of disease. Whenever the word "must" comes into science, however, we should be very suspicious of it. Must represents a process of belief instead of a process of demonstration. When we say a thing must be so, it is because we cannot prove that it is so. As a matter of fact, it would seem that diseases are not the subject of inheritance, though defects are.

The mendelian incidents of various defects or special peculiarities have been studied rather faithfully in recent years by the application of the principles and laws discovered by Abbot Mendel some sixty years ago but utterly neglected until about thirty years ago. There is no doubt that nose shape runs in families, and that as a consequence of that a good many nasal peculiarities and breathing difficulties can be better understood. Color of eyes runs in families,

and so do certain eye defects, especially the tendency to have different colored eyes. At the other end of the body, flat foot runs in families though there is no doubt at all that environment has a great deal to do with the development of it to such a degree as makes it painful and ultimately almost unbearable unless some sort of support is worn. Many occupations that require constant standing such as floor walker, doorkeeper or waiter, favor the development of flat foot though in most cases of the outspoken variety of it there has been an hereditary element of weakness of the supports around the ankle.

Left-handedness is a peculiarity which cannot be considered a defect that runs in families though I believe it has been found by statistics to be a recessive character and therefore to occur only about once in four times in the descendants of the left-handed. Left-handedness used to be spoken of as a defect, but baseball and certain other sports have made it very clear that left-handedness is compatible with the very highest development of bodily strength and athletic perfection of one kind or another. On the other hand, left-handed people have picked out in history a number of very prominent individuals who because of intellectual capacity and artistic talent have distinguished themselves far above the average of mankind. The striking example of a left-handed genius is, of course, Leonardo da Vinci, who is perhaps the most versatile of human beings among those who stand in the very first rank of artistic talent and inventive genius. His mirror handwriting was very probably due to the fact that, like so many other left-handers, when he was young he had the tendency to write in mirror handwriting and then preserved the habit in order that he might be able to make notes of his observations and suggestions for invention without having his knowledge or efforts in these directions readily detected by any one who would pick up the notes.

It would represent a very great gain for humanity if we were able to eliminate to a very great extent the idea of the inheritance of disease. We have learned in recent years how important it is for sufferers from disease to face their ailment with courage and not permit themselves to be overcome by the thought of its inevitable progress or its incurability because of the inheritance factor. That

has meant very much for tuberculosis. It would undoubtedly mean almost as much for epilepsy and it would brighten the lives not only of the insane themselves when they are in their more sensible moods, but above all of their relatives and friends, some of whom at least are in constant dread lest they should develop the mental alienation which they know to exist or perhaps have actually experienced in near relatives. The greatest medical maxim we have is, "Be sure to do no harm," *non nocere,* as they put it briefly in Latin. The theory of the inheritance of disease has been a violation of that. Most of it was an error. It would be much better for the physician to err somewhat on the other side.

TWO INTERESTING GALL-BLADDER CASES*

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THE first patient that I am presenting for clinic today is a case of a common bile-duct obstruction. I am presenting her in order to bring out a few points in the preparation of the patient for operation and to describe the Mason technic of cholecystogastrostomy. This technic I believe to be the best for short circuiting the bile in the presence of mechanical obstruction to the common duct.

The patient, Mrs. D., forty-five years old, entered the hospital complaining of loss of weight, fatigue, itching of the skin and a yellow complexion. She had been in good health up to six months ago and since then has gradually failed. She first noticed that she was losing strength and that physical efforts which formerly would not have taxed her to any degree were now becoming exceedingly difficult or altogether impossible. She "did not feel well," but could not describe her symptoms very clearly. Personally I have always felt that the expression, "Oh, I cannot tell exactly what bothers me, but I just do not feel well" is a very significant one. Being slightly alarmed over her condition, she weighed herself frequently and discovered a gradual but persistent loss of weight. A few months ago one of her friends first called her attention to her sallow, yellowish complexion. This yellow tint gradually increased until on admission to the hospital her skin was bronzed. Her urine was very dark colored. She did not volunteer any opinion as to the color of her stools. About one week before entering the hospital her skin began to itch and as the itching became more severe she finally decided to seek the medical advice she had so long postponed.

On admission she presented a typical picture of a chronic jaundice. Her sclerae and mucous membranes were deeply stained, her skin was a yellowish brown and there were scratch marks from

her head to her heels. There had evidently been a marked loss in weight.

Physical examination was essentially negative. On abdominal palpation no masses could be felt. The laboratory tests confirmed the diagnosis of jaundice and anemia. The icteric index was high; both Van den Bergh tests were positive. Bile was present in the urine, but also to a very slight extent in the stools, although the stools appeared acholic on observation. The hemoglobin was 30 per cent., with the red count under two million. As had been expected, the coagulation time was greatly prolonged. The diagnosis of a chronic biliary obstruction due probably to a malignancy of the pancreas was made.

From the standpoint of preoperative treatment, two important conditions must be considered: Firstly, the long coagulation time, and secondly, the anemia.

In any case of icterus, or whenever the coagulation time is prolonged, the danger of hemorrhage during and after operation is greatly increased. In a case such as this the surgeon must take steps before operation to diminish this danger by trying to restore the clotting action of the blood to as nearly normal as possible. We have known for a long time that there was an intimate association between the calcium content of the blood and its clotting time. For this reason calcium in some form has long been used. A very simple and efficacious method of administering calcium is the intravenous injection of 10 cubic centimeters of a 10 per cent. calcium chloride solution. The usual method of doing this is to give the injections at twenty-four-hour intervals for three days before operation. We have adopted this method almost as a routine preoperative measure in all jaundice cases whose condition is such that operation can be postponed for this period. The day of operation for clotting time was five minutes.

Just before operation a blood transfusion of 500 cubic centimeters of whole blood was given. This not only helped to combat the anemia, and to guard against shock, but also had its effect in still further helping the coagulation.

The operation was performed under spinal anesthesia, using 250 cubic centimeters of novocaine crystals dissolved in 7 cubic centimeters of the patient's own spinal fluid. I have been using spinal

anesthesia for the last two years and greatly prefer it to any other in stomach and gall-bladder surgery. The abdomen was opened through a right paramedian incision. The presenting liver was very dark and on its surface was a heavy white scar, evidently a metastastic new growth. The head of the pancreas was palpated and was found to be firm, nodular and enlarged, the diagnosis of carcinoma of the head of the pancreas apparently being thus confirmed. The gall-bladder was slightly thickened and distended, but not greatly enlarged, thus being an exception to Courvoisier's law. Courvoisier's law, as you remember, states that in the majority of cases of common duct obstruction due to stone the gall-bladder itself is small, while if due to carcinoma or other conditions, is large. This is true in about 80 per cent. of the cases. The common duct was found to be dilated.

It was obvious that some form of operation was called for which would reëstablish the flow of bile from the liver into the intestines. This could have been done by three ways: the first, creating a fistula between the gall-bladder and the stomach; the second, between the gall-bladder and duodenum; and the third, between the common duct and the duodenum—cholecystogastrostomy, cholecystoduodenostomy, and choleductoduodenostomy. In the first two the bile flows from the hepatic ducts into the common duct and then is dammed back through the cystic duct into the gall-bladder and from the gall-bladder into stomach or duodenum. The stomach is the usual site for gall-bladder anastomosis because it is more accessible. The outpouring of bile into the stomach, contrary to popular opinion, does not cause nausea. On the contrary the alkalinity may reduce pyloric tonicity and this may explain the relief of pain following cholecystogastrostomy in some cases.

Choleductoduodenostomy is indicated in those cases in which the gall-bladder has already been removed or where the cystic duct or gall-bladder cannot function (cancer of the gall-bladder itself, etc.).

The simplest and best method of cholecystogastrostomy that has yet been described is that of J. Tate Mason in the *Journal of the American Medical Association*, vol. 94, No. 1, January 4, 1930, p. 29. The abdomen is opened in the usual manner. The pathology is determined. The stomach and gall-bladder are exposed. A stab

wound is made on the anterior aspect of the stomach near the pylorus and near the greater curvature. A pair of curved forceps is placed through the stab wound into the stomach cavity. At a suitable place on or near the lesser curvature of the stomach near the pylorus a second stab wound is made and the blades of the curved forceps allowed to emerge. The fundus of the gall-bladder is grasped in the forceps and pulled through the lesser curvature wound, so that it rests well within the stomach. At times it is neces-

Fig. 1.
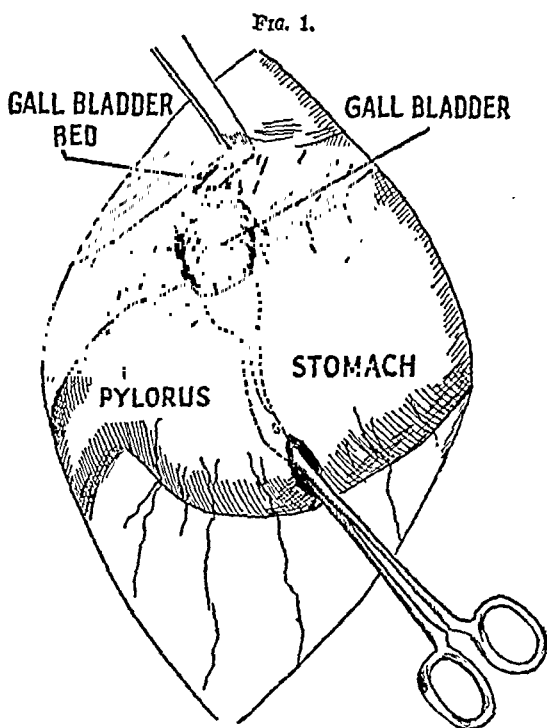
Bird's-eye view of operative technic.

sary to free the gall-bladder from the liver bed for an inch or two in order to obtain a sufficient mobility to pull the gall-bladder into the stomach. The gall-bladder is held in place by a single row of interrupted silk sutures. The gall-bladder is now opened by passing a pair of scissors through the first stab wound and incising the tip of the gall-bladder, preferably in the groove of crushed tissue caused by the blades of the forceps. The desired fistulous tract having been established, the first stab wound into the stomach is closed.

The operation has many advantages over the older methods of anastomosis. In the first place it is much simpler, it can be accom-

plished almost as quickly as it takes me to describe it, there is no chance of leakage, and, furthermore, it is possible that the tip of the gall-bladder may act as a valve permitting bile to flow into the stomach but preventing stomach contents from getting into the gall-bladder.

The postoperative course in the case I am showing was uneventful. The jaundice started to clear up immediately. Thirty-six hours after operation the stools were bile colored. The itching stopped and in a short time the patient gained in strength, weight and in appearance, and now four months after the operation she is leading her normal life, although she does fatigue more readily than formerly. Obviously the ultimate outcome has not been altered in any way by our operation.

Later Note.—A week subsequent to being shown at clinic the patient came back to the hospital because of abdominal pain, chills and fever. Her temperature ranged from subnormal to 106° F. About a week later she died. A postmortem was performed. The liver was smaller than at operation but now showed several scars, all of which on section were metastases. The gall-bladder lay buried into the stomach as at the close of operation. The gall-bladder was apparently normal except for a definite thickening as were the ducts. The enlargement of the common duct was less marked than at the time of operation. The stomach was normal. The invaginated fundus of the gall-bladder had atrophied, leaving a narrow rim of tissue surrounding the patent gall-bladder fistula. On opening the duodenum a large, ulcerating, new growth was seen involving the posterior wall of the duodenum at the site of the ampulla of Vater. The head of the pancreas was hard but the body and tail were soft. The diagnosis apparently was a primary carcinoma of the ampulla of Vater, with extension into the duodenum and pancreas, with secondary metastasis into the liver. The quick termination of the case and fever could be explained only on the basis of liver damage secondary to metastases although it is possible that had a postmortem of the brain been allowed a metastasis in the medulla might have been discovered.

Summary.—In brief, then, this case is of interest for the following reasons: A chronic jaundice without enlargement of the gall-bladder was diagnosed in spite of Courvoisier's law as an obstructive

jaundice due to malignancy. The preoperative treatment consisted of blood transfusion to combat the anemia and three intravenous injections of calcium chlorid to overcome the lack of coagulation. At operation a detour for the bile was established through the cystic duct and gall-bladder into the stomach. This was done by pulling the gall-bladder through a stab wound into the gastric cavity by the method of J. Tate Mason. The temporary improvement proved the efficacy of the operation.

The second case for demonstration today is also a case in which an artificial bile-tract had to be established. This time, in the absence of the gall-bladder a common duct-duodenal anastomosis, (choleductoduodenostomy) was made.

The patient, a middle-aged woman, has had attacks of typical biliary colic all her adult life. About twenty years ago a cholecystostomy was performed and this operation gave her relief for about five years. About ten years ago she was operated upon again and this time the gall-bladder was removed. The convalescence from this operation was very stormy. She finally did recover, but a sinus remained, from which, from time to time, a small amount of bile would escape. She had frequent attacks of biliary colic, associated with jaundice and clay-colored stools. Toward the end of these attacks more than the usual amount of bile would be discharged from the sinus. Her last colic started a few days before admission and was very severe. Her pains were situated under the right costal margin and radiated typically toward the back. She was definitely jaundiced. By the time of her admission to the hospital the attack had subsided and her icterus almost cleared.

Physical examination disclosed nothing of interest, as far as the diagnosis of the case was concerned, further than the scars of previous operations and a small sinus leading from the end of one of the scars. A few cubic centimeters per diem of a mucoid, bile-stained fluid exuded from the sinus. The icterus index was still high and both Van den Bergh tests (tests for bile salts in the blood) were positive. Her coagulation time was delayed.

Her preoperative preparation consisted especially in combating the possible danger of hemorrhage, by intravenous injection of 10 cubic centimeters of a 10 per cent. solution of calcium chlorid on

three successive days. The operation was performed under spinal anesthesia.

The incision included the old scar. The region of the gall-bladder was one mass of firm adhesions. The duodenum was liberated from a few superficial adhesions and then pulled downward and the common duct region exposed. By careful dissection the common duct was demonstrated up to the site of what was probably the remnant of the cystic duct. This now was the beginning of the sinus which lead in a tortuous path to the abdominal wall. The common duct was greatly distended so that it measured at least 2 centimeters in diameter. Near the duodenum it was constricted and imbedded in dense adhesions.

· The sequence of the pathological changes could probably be reconstructed as follows. A condition of cholelithiasis had developed. This was temporarily relieved by the cholecystostomy. The condition recurred, as we all know nowadays that it does, and a cholecystectomy was performed. At that time a stone in the common duct may have been overlooked, or may have been sought with the resultant injury and stenosis of the common duct. A biliary fistula resulted. Had the stenosis been complete the sinus formed might have remained patent and adequate as far as drainage was concerned, but because of the intermittent nature of the obstruction the sinus itself tended to heal and therefore the ensuing violent biliary colics. At the height of these colics a sufficient *vis a tergo* evidently developed to open the sinus. After the pressure was relieved and the edema of the common duct had subsided, the normal course of the bile flow would be resumed.

The operation was performed under spinal anesthesia. An incision had been planned to preserve the fistula, with the idea of perhaps using it as a switch track for the bile. It was found, however, that the fistula was all too small and that another type of detour would have to be chosen. An anastomosis of the enlarged common duct to the adjacent duodenum was decided upon.

The technic of choleductoduodenostomy is simple and can best be described by comparing it to a miniature side-to-side entero-enterostomy. An incision was made into the distended common duct, the bile content having first been aspirated. A guy rope of fairly heavy silk was placed at either end of the incision. The

duodenum was placed in juxtaposition to the common duct and an incision of equal length to that in the duct was made through all coats. It makes no difference whether the incision be longitudinal or transverse. The anastomosis was performed with a simple over-and-over stitch of fine catgut, reinforced with a row of silk Lembert sutures. The duodenum was anchored to the common duct above and below the anastomosis so as to take away all tension on the suture line. Frequently it is necessary, in order to insure the free flow of bile after operation, to pass a catheter through the common duct, through the anastomosis into the duodenum, and keep it there until the patency of the stoma is definitely established. In this case, however, the common duct was well exposed, the duodenum readily mobilized, so that it was easy to secure a large opening. The wound was closed without drainage.

It is now a little over six months since the operation and the patient is apparently in excellent condition and claims that she feels better than she has in years. There have been no attacks of pain and we do not expect that there will be.

Summary.—This case is shown as a corrolary of the first case, to demonstrate a different type of operation for short-circuiting the bile, namely a choleductoduodenostomy. This operation is used when for any one of many reasons the gall-bladder itself is not available for purposes of anastomosis. In this case the gall-bladder had been excised. It is not the purpose of this paper to compare the merits of the two operations. The indications for each are clear cut and definite. However, if in a case both methods are possible, the chole-cystogastrostomy of Mason is the operation of choice.

THE EXAMINATION OF THE MUSCLES OF THE EYES IN CHILDREN

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In THIS day of periodic health examinations, there falls to the paediatrician the task of finding abnormalities before symptoms develop and the giving of prognoses in incipient conditions. From the standpoint of the ophthalmologist, it becomes necessary to adopt a systematic fashion in the examination of every eye.

In this article I wish to dwell on only a short discussion of the muscles of the eye—normal and abnormal findings with a suggestion on treatment.

Hirschberg, many years ago, called attention to the corneal reflex. With the patient looking straight forward at a light (light of an ophthalmoscope with the head off is very practical), the reflex produced on the cornea should fall at symmetrical positions in each eye. Remembering that the average-sized pupil is about four millimeters and that every one millimeter of muscle turning is equivalent to about seven-degree prism diopters, we get a rough idea as to whether or not our patients' eyes are straight on near fixation or not. A turning out of the eyes is known as exotropia, a turning in of the eye, esotropia, and if one eye is on a higher level than the other, we speak of a hypertropia.

We next carry the eyes in the six cardinal positions to note their excursion. A white beaded pin is usually used. The external and internal recti act simply to turn the eye temporally and nasally. In looking up and out, say to the right, we are using the right superior rectus and left inferior oblique; up and to the left, left superior rectus and right inferior oblique; down or to the right, right inferior rectus and left superior oblique; and down or to the left, right superior oblique and left inferior rectus.

By this we determine paralyses, paresis (weakness) and the rather uncommon Duane syndrome. Practically all the cranial nerves have bilateral innervation, this accounting for paresis in

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contra-distinction to complete paralysis. In examinations such as are conducted in a refraction clinic, in which every case has a thorough muscle examination, paresis of superior recti is, comparatively speaking, fairly common.

Duane syndrome is due to faulty muscular development, the recti (usually external) being fibrous and not giving, so that in looking inward the action of the opposing internal rectus pulls the eye into the orbit, thus making the eye appear sunken and the palpebral fissure narrower. In looking in the direction of the greatest action of the faulty muscle there is little or no action.

We now wish to consider what the tendencies of the muscles are. Accommodation and convergence go hand in hand so that by deter-
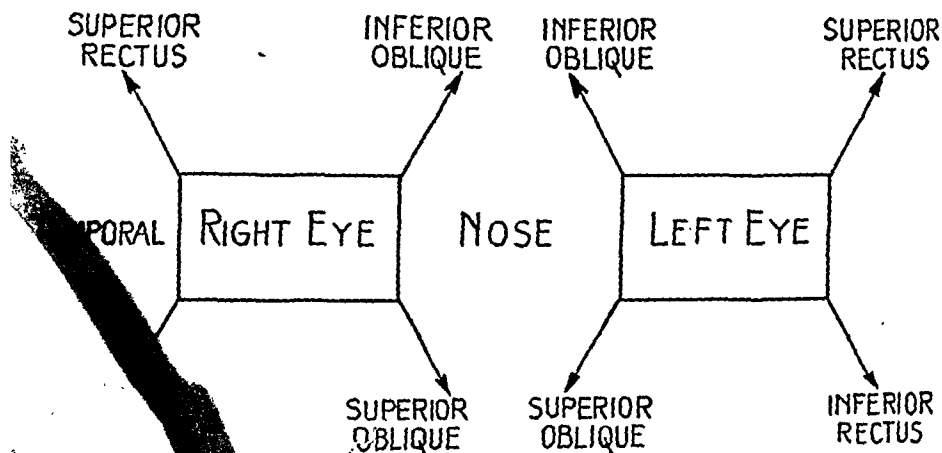

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SUPERIOR        INFERIOR    INFERIOR         SUPERIOR
 RECTUS          OBLIQUE     OBLIQUE          RECTUS

TEMPORAL  RIGHT EYE    NOSE    LEFT EYE

          SUPERIOR   SUPERIOR          INFERIOR
          OBLIQUE    OBLIQUE           RECTUS
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...erge nce tendency we can have a fair idea as to the ...d thus as to whether there is evidence of strain in ...not.

...ust be cleared up. In the young child, before the ...the nasal bridge, there is an epicanthal appearance ...s as the nasal bridge grows forward. This condition ...tion of a turning in of the eye. This can be shown ...nerely picking up the skin over the nose, when this ...then disappears.

...st.—This is to uncover the latent disposition of the ...nt is told to focus on a white beaded pin. One ...en the other eye is allowed to fix on the pin. ...the eye was under cover is told by whether

or not the now uncovered eye comes in or out to fix on the pin. Normally under cover the eye should be out and when uncovered, come in to fix. This is called exophoria. If the eye turns out to fix (meaning it was turned in under cover) then this is abnormal and is known as esophoria. These phorias show over or under action of the external and internal recti. If the eyes come down to fix or go up to fix, it means faulty action of one of the other four muscles. This is called hyperphoria. Any hyperphoria is abnormal.

From a practical standpoint in measuring these amounts one needs a four-degree and eight-degree prism. If there is an exophoria, put the four-degree prism base in in front of one eye and repeat the cover test, and then the eight-degree prism. Normal exophoria should fall here four degrees to eight degrees. In measuring esophoria, base should be put out. But considering any esophoria abnormal and remembering the normal findings, we can see in a few seconds what the tendencies are. Of course, one degree either way would still be normal.

Now if we think we have a convergent strabismus and the cover test shows exophoria, immediately we can feel that our first opinion was wrong. Thus the value of the cover test is illustrated.

Muscle anomalies can be classified into the following classes:

1. Convergent Excess;
2. Convergent Insufficiency;
3. Divergent Excess;
4. Divergent Insufficiency.

The cover test should be done for distance twenty feet as well as for near thirteen inches because convergent anomalies express themselves mostly in near fixation, divergent anomalies in distant fixation. Normally, there is very little movement in distant fixation, the normal findings being exophoria (one or two), esophoria (one or two) and orthophoria (no motion).

To complete the muscle examination, a millimeter rule is now necessary. Holding one end on the bridge of the nose, we now bring the pin in, asking the patient to fix. The point at which one eye turns out is the near point of convergence (normally sixty to ninety millimeters). (After adding in twenty-five millimeters for the distance from bridge of nose to eye.)

The findings for convergent excess is esophoria or orthophoria for near; near P.C.B. Normal for distance, or nearer normal than findings for near. Convergence insufficiency: exophoria greater than eight. Distant P.C.B. For distance normal or nearer normal findings. Divergent excess: exophoria greater than one or two. Normal or nearer normal muscle findings for near, Divergent Insufficiency (secondary to convergent excess, usually).

Any hyperphoria is abnormal and it is the attempt to do away with the diplopia that would develop that causes the condition of head tilt. Once a fusion is firmly developed we wish to continue with binocular single vision. Head tilt is fairly common, and the individual many times does not realize that he has it or why he has it. With a red glass in front of one eye, carrying the light in the six cardinal positions with the head straight, diplopia can be elicited in the field of the paretic muscle. We then allow the patient to assume his natural head tilt to the right or left shoulder and he volunteers the information that the two lights are either much closer or he is able to fuse them now. In marked overshoot of the inferior oblique accompanying a superior rectus paresis of the other eye a tenotomy here of the inferior oblique will many times do away with a head tilt.

To sum up: Routine examination of the muscles should include:

1. Seeing where light reflex falls on both corneae;
2. Excursion;
3. Cover test;   near distance;
4. P.C.B.

Up to now we have considered tendencies; a few words on the condition of squint seem now in order.

The eye is anatomically developed at birth. Although vision is feeble, a strong light apparently causes discomfort. Fixation is not present usually till six weeks, with coördination at three months or later. From this time up to six or seven years the fusion sense is being developed and therefore this is the time of prime importance for the recognition and correction of any beginning squint.

The essential factor which allows a deviation to occur is the defect of fusion faculty. The eyes being uncontrolled by the neces-

sity for fusion may be kept straight by motor coördination, but they are in a state of unstable equilibrium and are ready to squint either inwards or outwards in response to influences which have no effect if the fusion faculty is normal. In a very large percentage of cases, as suggested before, it is the state of refraction that determines the deviation.

Worth has outlined the investigation of squint as follows:

1. History: age onset; mode of onset (as after an acute illness); heredity, in 56 per cent. of his cases he has found an hereditary history.

2. Character of squint: divergent, convergent, alternating, periodic, constant, comitant.

3. Power of fixation of deviating eye. If there is no power of fixation then chances of non-operative measures succeeding are practically nil.

4. Excursion.

5. Vision: a good plan is to first bring the card with animals or figures up to the child and see that he can name them. Then try at a twenty-foot distance. Striking the letters or figures and pointing them out will enable one to identify figures that he would not attempt otherwise. The letter "E" in different positions on a card with an iron "E" or one made of paper in the child's hands holding the "E" as he sees it can be used with children of three to advantage.

6. Fusion faculty: There are three types of fusion, the simplest, an example of which is a card which on one side shows a parrot and adjoining a cage—the fusion, putting the parrot in the cage. The greatest degree of fusion brings out depth as looking at two circles of different size and fusion of them to appear as an inverted washtub. The knowledge of whether the ability to fuse exists and to what degree is of the paramount importance and takes much time in eliciting. With a fusion power, the training will be very much easier.

7. Angle of deviation: roughly, every millimeter of turning is seven degrees of muscle turning.

8. Refraction (under atropine).

The treatment of squint has as its objects:

(a) Prevention of deterioration of vision of deviating eye and, if possible, its restoration.

(b) Removal of cause of squint, by training the fusion sense at the earliest possible age.

(c) Restoration of visual axes to their normal relative directions.

The method of treating is:

1. Optical correction.

2. Occlusion or instillation of atropine in fixing eye to make the child use the poorer eye.

3. Training of fusion sense by use of the amblyoscope.

If, after a reasonable time, no results are seen, we can then consider operative intervention.

To sum up, we must realize that fusion sense is developed up to the age of six or seven and therefore we should not wait for a child to outgrow a squint but look after him during this period with patience and perseverance.

ANESTHESIA

By T. DRYSDALE BUCHANAN

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ANESTHESIA is so linked with surgery that any article concerning operative procedure would be incomplete without some word regarding not only new anesthetics and improvements in administration but also reporting experiences with the older and standard agents.

During the past year the Anesthetic Service has had an exceptional opportunity to try out some of the new drugs and the results are here given together with observations on the standard agents presenting either some new phase or corroborating deductions made by others, which sometimes proves as valuable as original suggestions.

The agents employed to produce anesthesia during the past year were, in the order of their frequency, nitrous oxide ether sequence, ethylene oxygen, spinal anesthesia, nitrous oxide and oxygen, and the various forms of nerve block and infiltration.

The advocates of spinal anesthesia were active in their propaganda, but the Anesthetic Service made no attempt to influence the surgeons in their choice of methods or agents, and, notwithstanding this statement, ether still remained the popular agent for abdominal surgery and naturally the general anesthetic for tonsillectomies.

The staff surgeons were of one accord in wishing to extend the scope of ethylene oxygen even in laparotomies, with the result that more cases were operated upon under this anesthetic in the past year than ever before.

It is futile to argue that the same degree of relaxation of the abdominal muscles or the same absence of intestinal protrusion can be obtained from the gaseous anesthetics as can be accomplished by spinal or ether anesthesia, but with the patience and coöperation of the surgeons, many more laparotomies can be performed under ethylene or gas oxygen than have been attempted heretofore with end-results as regards freedom or minimization of nausea, vomiting, kidney and bronchial complications, highly satisfactory to both patient and surgeon.

In the interest of accuracy, it must be stated that frequently it was necessary to add ether to the gaseous agents at certain stages of the operation, but this was usually of such an amount as not to influence the postoperative results.

Both anesthetists and surgeons were of the conviction that the addition of ether was less harmful to the patient than fighting back protruding intestines or excessive pulling on retractors.

Following out a routine since the opening of the hospital, all adult patients were given a dose of morphin and atropin hyperdermatically one hour before operation, provided no contra-indications presented. This dosage varied from one-eighth to one-quarter grain of morphin, depending upon the estimated resistance of the individual. One one-hundred and fiftieth of atropin was the standard amount, though later experiments would seem to show that one-three hundredth of a grain would serve as well with less drying of the mouth and throat, so often objected to by patients.

Ethylene anesthesia was preferred to nitrous oxide because of its greater relaxation of muscles, decreased respiratory effort, with consequent avoidance of cardiac strain, the greater freedom from cyanosis and the fact that children of all ages can be anesthetized with greater safety than with nitrous oxide.

Not unmindful of the explosibility of ethylene, every precaution against electric sparks, open flames and heated cautery has been observed, and in order to avoid moving the patient during the administration, the anesthetic is started with the patient on the table in the operating room or else the induction is done under nitrous oxide.

The Engineer Department of the hospital reported, after a test, that the conductivity of the operating room floors was faulty, so that a grounded metal plate is placed at the entrance. No one can get into the room without first stepping on the plate and thus discharging any static charge built up from the hall floors. The machines are grounded as per recommendations of the underwriters, and, in addition, each one is equipped with a water bottle so that all ethylene gas must pass through the water before it reaches the breathing bag. This gives a humidity in the bag which precludes static spark.

In order to further increase this humidity, each bag has a well-soaked sponge in it. This additional safeguard was instituted because it is the consensus of opinion that humidity is the greatest

protection against igniting ethylene. Since its discovery, there has never been an explosion or fire from ethylene in the hospital.

Through the courtesy of the Union Carbide Co., the density of explosive gases in the operating room and adjoining halls was tested by a delicate instrument.

This meter is so sensitive that a trace of gas will be registered and a red mark indicates when the gases reach explosive concentration.

It was found that the gas was richest in the vicinity of the patient's head, but at no time reached dangerous proportion outside the breathing bag, but on closing the operating room door for one-half hour, the arrow began to travel toward the red mark, still, however, remaining well on the safety side of the danger mark.

It would seem in the interest of safety, however, that when using ethylene, good ventilation of the room is essential.

To further increase the scope of gaseous anesthetics, some studies were made in the use of one of the barbituric acid endovenous anesthetics; namely, sodium amytal. No attempt was made to give it in dosage enough to produce anesthesia, but in a very limited number of cases, complete narcosis was produced with the injection of fifteen grains.

In the majority of the cases, the patient fell into an easy sleep sometimes before the full dose of fifteen grains was injected. They were easily aroused from this sleep, so it was necessary to begin either ethylene or gas oxygen before the initial incision was made.

When this was done, the operations could be completed with a continuing of about half the ordinary quantities of these gases.

The advised technic should be followed closely, particularly as to the rate of injection, which should not exceed one cubic centimetre per minute, and when the injection is completed, better results are obtained if an interval of twenty minutes elapses before beginning the operation. In some instances a longer time was necessary before any benefits from the amytal were evident.

Patients varied in the time and state of recovery, some awakening immediately and others sleeping for many hours; some arousing quietly, others being very restless; a few were mildly maniacal, while all exhibited varying degrees of amnesia.

One patient, a French woman, had two days of thinking the

Franco-Prussian War was being refought, and insisted her nurse, of German extraction, had treated her unkindly.

It was noted that those whose recovery to consciousness was longest, were the ones who exhibited the greatest cerebral irritation. This restlessness, desire to get out of bed, *etc.*, were easily controlled by morphin.

When amytal is to be used, instructions must be given the nurses of the greater need for constant watchfulness until the patient is again conscious and rational.

On the whole, the results obtained were so satisfactory that a further study is warranted, though discretion would indicate that it is not wise to persist in the injection after the patient goes to sleep.

Throughout the year, gastric lavage has been used after each laparotomy. This has been a factor in reducing not only postoperative nausea, but has minimized the gas pains, for it rids the stomach of the non-absorbable nitrogen in the air which is frequently gulped during the induction stage of anesthesia.

The results obtained in the use of 10 per cent. carbon dioxide inhalations for hiccoughs have been gratifying, and a few inhalations of this gas at two-hour intervals is recommended as a means of ventilating the lungs following upper abdominal operations. This procedure, theoretically, should reduce the incidence of pneumonia.

At the present writing, the service is engaged in a survey of the pneumonias occurring postoperatively. This report is incomplete, but shows that since October 1 (the date of beginning of survey) no pneumonias have followed either nitrous oxide or ethylene, when given alone, but two cases have occurred (both in upper abdominal cases, in which CO_2 was not used), one where amytal was used and one where ether was used with these gases. Four pneumonias followed spinal anesthesia.

Six of the nine lung complications occurred on the third floor, where, for the most part, the patients admitted are not as well-nourished as the private patients, and where, also, they are not sent in until their particular disease is apt to be more advanced as they are financially unable to employ a physician early in their illness.

The spinal anesthesias given by the staff anesthetists have been confined to cases where general anesthesia was contra-indicated. It

was found the tempered gold needle was most serviceable and that an added safeguard against meningeal infection was furnished by the canula as used by Sise as it prevented the point of the needle penetrating the membranes from coming in contact with any sweat glands.

SUMMARY

The gaseous anesthetic agents have a greater scope in surgery provided there is teamwork between surgeon and anesthetist throughout, but in the field of abdominal surgery particularly, it is frequently necessary to add sufficient ether to produce satisfactory relaxation.

Gaseous agents require an expert administrator as the margin of safety is not as wide as in ether.

Even when these agents fail to produce the desired depth of anesthesia, their use makes possible the minimum amount of ether. The amount of ether required with them is usually so small as to leave the patient free from postanesthetic sequelae.

When it is evident that the anesthesia is unsatisfactory under nitrous oxide or ethylene, nothing is gained in withholding ether and trying to force a deeper narcosis by gases above.

Some decided assistance is obtained toward better anesthesia by the endovenous or colonic injection of small doses of the barbituric acid compounds, the greatest objection to them being the uncertain action of a standard dose and the uncertain mental reaction afterwards.

The best interests of patient, surgeon and hospital are safeguarded by having an anesthetic service under the supervision of a physician. Any community large enough to maintain a hospital can find at least one physician who can be persuaded to interest himself or herself in this specialty even if economic conditions require that it be combined with some other specialty or with general practice.

Courses in anesthesia are now available to all physicians in various cities and excellent journals devoted exclusively to anesthesia and analgesia are obtainable at moderate subscription rates, so that one far removed from a metropolis can keep thoroughly posted.

The Past Five Years of Syphilologic Progress[*]

BISMUTH IN THE TREATMENT OF SYPHILIS

By CARROLL S. WRIGHT, M.D.

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of Medicine, University of Pennsylvania, Philadelphia

THE discovery that bismuth, a drug previously considered comparatively inert, exerts a powerful action against syphilis marks an advance in the therapy of that disease which is exceeded only by the chemotherapeutic research of Ehrlich, which resulted in the discovery of the arsenobenzenes. Although bismuth has been used in the treatment of syphilis only since 1921, attention was first directed to its possible employment by Balzer in 1889. Balzer experimented with dogs, but the severe toxic symptoms produced by bismuth caused him to abandon his studies. In 1916, Sauton and Robert, following the publication of their work on the bactericidal action of bismuth compounds, reported on the spirocheticidal action of the drug in hen spirilloisis. Their anticipated work on the action of bismuth in the treatment of recurrent fever and of syphilis was interrupted by the World War. It remained for Sazerac and Levaditi to prove the value of this drug in the treatment of syphilis. As a result of their studies they concluded that "bismuth exercised an incontestable therapeutic action upon experimental syphilis," and the next step was the application of bismuth therapy to human syphilis. Since that time, bismuth has been almost universally accepted as a powerful weapon in the fight against syphilis, and recognized as a drug which, though inferior therapeutically to the arsenobenzenes, is superior to mercury both in therapeutic value and in its lower toxicity.

The past five years have seen the introduction of hundreds of

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[*] Papers read at a stated meeting of the College of Physicians of Philadelphia, May 6, 1931, in a symposium on syphilis.

proprietary bismuth preparations, put up in diverse forms—water-soluble, insoluble, fat-soluble, colloidal, and metallic preparations. To choose from these, the preparation giving the maximum therapeutic effect with the minimum toxicity is indeed a difficult problem. Fortunately, the literature is replete with excellent papers on the pharmacology of bismuth and a brief summary of a few of these studies may prove helpful. Particularly important are the studies of Levaditi and his co-workers, Lomholt, Gruhzit and Sultzberger, and more recently Hanzlik and his co-workers. The average content of bismuth in the products available ranges from only 10 milligrams per cubic centimetre of colloidal bismuth up to 73 to 100 per cent. in some of the metallic bismuth compounds. However, Hanzlik concluded that the magnitude of bismuth content is probably the least important criterion which should determine the choice of a product, and that other criteria such as vehicle, tolerance, absorption and excretion, as well as antisyphilitic efficiency are much more important. Everything else being equal, the adjustment of dosage will compensate variations in bismuth content.

Collectively, the results given in the literature on the absorption of bismuth obtained by chemical analysis of tissues after the injection of different products indicate that all types of bismuth are well absorbed from the site of injection regardless of the type of vehicle; the poorest absorption occurs with the insoluble products, used in oil or aqueous medium, and the greatest with the soluble products used in aqueous medium. After urinary excretion is completed, roughly one-half of the administered bismuth remains in the body to be gradually excreted over long periods of time. Levaditi's most recent studies have been concerned with fat-soluble bismuth which he believes constitutes a link between the soluble bismuth salts and the insoluble derivatives, resembling the former in rapidity of absorption and spirocheticidal activity, and the latter in the formation of a local deposit with slow dissociation of the fat from the bismuth giving a slow and prolonged therapeutic action. Roentgenographic studies indicate that metallic bismuth may be unabsorbed after 150 days and there is a question whether metallic-bismuth preparations should be used because of the danger of cumulative action. From our present knowledge it would seem advisable to employ water-soluble preparations in aqueous or tissue-soluble medium or lipo-

soluble preparations, although some of the insoluble salts have been used with excellent therapeutic results and have been well tolerated.

As to the avenue of introduction of bismuth in the therapy of syphilis, the limitations are much more marked than in the case of mercury. Klauder, Oelze and others have shown that very little absorption takes place through the unbroken skin. It has also been shown that little or none of the drug is absorbed through inhalation. Absorption through the gastro-intestinal tract is slow and uncertain. It is only necessary to consider that bismuth has been used for several decades in the therapeusis of various gastro-intestinal diseases and more recently has been employed widely in roentgenographic studies of the gastro-intestinal tract with but rare instances of toxic effects to realize its slight absorption through the walls of the intestinal tract. Sazerac and Levaditi found that the administration of bismuth orally had no effect upon rabbit syphilis. They furthermore found that bismuth administered intravenously was many times more toxic than when injected into the muscles. The council on therapeutics of the American Medical Association has taken a definite stand against the employment of intravenous bismuth therapy. The consensus of opinion at the present time is in favor of administering bismuth in the treatment of syphilis only by the intramuscular route. The technic of its administration is exactly the same as for the intramuscular injection of mercury.

As to the efficacy of bismuth in the therapy of human syphilis, there is no longer any doubt. It causes the disappearance of spirochetes from local lesions; it results in prompt involution of cutaneous manifestations; it is of distinct value in the treatment of visceral syphilis; at the same time administration of the drug is rarely followed by any untoward symptoms. I will very briefly enlarge upon the effects of this drug in the treatment of early and late syphilis.

Employed in primary syphilis, bismuth results in the rapid disappearance of spirochetes from the surface of the chancre, sometimes within twenty-four hours after the first injection, and almost invariably after the second injection. After three injections, spirochetes can no longer be found even by gland puncture. Healing of the primary lesion progresses more slowly than when the arsenobenzenes are used, but the action on the involution of the satellite

adenitis has been found to be more rapid with bismuth. The influence of bismuth on the secondary manifestations of syphilis is rapid—almost as rapid as the arsenobenzenes. However, in spite of the excellent therapeutic activity of bismuth in early syphilis, it is best not to employ it alone but rather to use it as an adjunct to the arsenobenzenes, in accordance with a method suggested six years ago by Dr. Jay F. Schamberg. Weekly intramuscular injections of bismuth are employed for the purpose of forming depots of ammunition from which the spirochetes are continually bombarded between the shots of that more telling but brief-acting weapon neoarsphenamin.

In the treatment of visceral syphilis, bismuth is perhaps the drug of choice. Its action in tertiary hepatic syphilis is slower than that of the arsenobenzenes, but this is desirable. The remedy of choice, particularly in the hypertrophic gummous hepatitis, is one which will cause a slow involution and absorption of the lesions, thus giving an opportunity for the establishment of a collateral circulation. Bismuth is apparently not hepatotoxic.

Since the publications of Brooks, Wile, and Kothay and Müller several years ago, it has been generally recognized that it is inadvisable to employ a drug in the treatment of cardiovascular syphilis with too rapid a therapeutic effect. Bismuth is an admirable remedy in this type of visceral syphilis for its action is efficacious and yet not too rapid. One of the most extensive studies of cardiovascular syphilis and bismuth therapy is that of Laubry and Bordet, who found that there was amelioration of the functional trouble as quickly as arsenic preparations would give; that there was an arresting action on the progress of the lesions as confirmed by radioscopic examinations, and that tolerance to the drug was better than tolerance to the arsenobenzenes. This has been my experience. I have witnessed the gradual disappearance, as evidenced by serial roentgenographic studies, of an aortic aneurysm under the influence of pure bismuth therapy.

The results of the treatment of neurosyphilis with bismuth depend upon the amount of the drug which penetrates to the central nervous system and the nature of the lesion. This drug is filtered out by the choroid plexus for the most part, but some writers have recorded the finding of small amounts of bismuth in the spinal fluid

in patients under treatment. Even though the amounts of the drug that penetrate into the central nervous system must be small, the clinical results from its use are sometimes striking. Early syphilitic meningitis may respond quickly and there may be rapid cessation syphilitic headache; vertigo, meningoradicular pains and the lancinating pains of tabes are also often quickly relieved. In true general paralysis, bismuth may result in temporary improvement, but advanced cases show no response.

Bismuth exerts an incontestably favorable action in the treatment of congenital syphilis. At the congenital syphilis clinic at the Graduate Hospital, where from fifty to sixty children are treated weekly, I have employed bismuth extensively since 1923 with excellent therapeutic results both as regards the effect of the drug upon active manifestations of the disease and the effect on the Wassermann reaction. The reports of Cabaout in France, of Bronson and Caffey in this country, and of others, testify to the value of bismuth in the therapy of congenital syphilis. In 1930, Doctor Perlman and I reported the excellent therapeutic results following the use of bismuth alone in the treatment of interstitial keratitis. Kleefeld of France believes bismuth to be superior to any other antisyphilitic remedy in the therapy of interstitial keratitis. There are practically no ill effects following the administration of this drug to children and infants, and the use of comparatively large doses causes little local pain.

In the treatment of the syphilitic pregnant woman where there is no kidney disturbance, bismuth is distinctly the remedy of choice as an adjunct to arsenobenzene therapy. When there is evidence of renal irritation, bismuth alone may be employed with little or no increase in the degree of irritation.

Fournier and Guenot were the first to study the effect of bismuth upon the Wassermann reaction and they found that whatever the stage of the disease, the reaction was favorably affected, sometimes becoming negative before the completion of the first series of injections. In 1927, I reported the effect of bismuth upon the blood Wassermann reaction of 128 patients who had had previous therapy with an arsenobenzene and mercury. Of these 128 only twenty-six, or approximately 20 per cent., were Wassermann negative after an average of eighteen injections of arsenobenzene, and

six injections of mercury salicylate. Of the 102 still Wassermann positive, fifty-two (or 51 per cent.) were serologically negative after an average of fifteen injections (of 100 milligrams each) of bismuth.

As to the complications of bismuth therapy, they are few. Studies of the absorption of the drug have shown that large doses are unnecessary, and when small doses are employed there are relatively few signs of intolerance. A blue line may develop on the gum margin, but this offers no objection to continuance of the drug. Odontalgia and salivation are rare, but may occasionally mark the beginning of a bismuth stomatitis. Albuminuria may occur but it is rare. So rare are complications from bismuth therapy, that in a series of more than 25,000 injections given in the past nine years at the Graduate Hospital, there has never been a severe untoward effect.

Ten years have passed since Sazerac and Levaditi and their co-workers, Fournier and Guenot, laid down the principles of bismuth therapy, and in a recent paper published in this country Levaditi has reiterated these principles. Although he believes that their truth has been fully proven in the past ten years, I feel that some allowance must be made for the fact that Levaditi is trying to make the strongest possible case for bismuth, which is in a way a child of his own rearing. He gives the following ten principles of bismuth therapy, all attesting as to its value as an antisyphilitic remedy and to its innocuousness:

(1) Bismuth has a curative and preventive action in primary, secondary and tertiary syphilis, in the visceral manifestations of syphilis, in acute syphilis of the central nervous system and in certain forms of parasyphilis.

(2) It causes the rapid disappearance of the treponema from primary and secondary specific lesions, and sometimes after the first injection, more often after the second.

(3) It sterilizes the lymphatic glands as demonstrated by experiments upon animals and by the results of gland punctures performed after the commencement of treatment.

(4) It causes a favorable modification of the reactions of the blood and spinal fluid. Applied to preserologic period bismuth therapy can keep these reactions negative indefinitely, which is an indication in favor of the disease being cured. If bismuth therapy

is commenced when these reactions are already positive, it succeeds in rendering them negative.—It is certain that the curative action continues after the physician has ceased the administration of bismuth. Once serum reactions are negative they can be kept negative indefinitely.

(5) These data prove that bismuth exercises a profound and lasting curative action in syphilis, due to the fact that, in contrast to arsenic, it is not eliminated rapidly.

(6) *Bismuth acts where arsenic fails—in cases labeled arsenic-resistant, bismuth displays a remarkable efficacy.* (Levaditi should also say that the reverse may be true—that arsenic acts where bismuth fails.)

(7) In comparison today, one is forced to admit that arsenic therapy has only one advantage over bismuth therapy: this is, that arsenic, being administered intravenously and absorbed quickly, causes a more rapid disappearance of open specific lesions that bismuth injected intramuscularly. *But the difference is one of several* hours, or at the most two days, to the advantage of the arsenic. This has a certain importance from the point of view of the prophylaxis of syphilis, prevention being all the more efficient the more rapidly spirochetes disappear.—But this advantage of arsenic is counterbalanced by the disadvantages of arsenic therapy, the immediate or delayed complications, the rapidity of elimination of arsenic, and the frequency of relapses.—

(8) *Another advantage of bismuth therapy lies in its absolute* innocuousness. Apart from some complications, all curable and easily avoided, nothing very troublesome has been laid to the account of bismuth. This gives the physician a tranquillity he never has when employing the arsenobenzenes.

(9) In the opinion of all experimenters, bismuth is superior in therapeutic properties to mercury.

(10) Finally, bismuth is efficacious *not only in acquired syphilis but also in congenital syphilis.*

FEVER THERAPY IN THE TREATMENT OF SYPHILIS

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DESPITE the signal therapeutic advances that were made in the treatment of syphilis, late parenchymatous involvement of the brain and cord—in other words, paresis and tabes dorsalis—were up to a decade ago barely influenced by therapy. After paresis had once developed, the arsenobenzenes had but little effect upon its progress. Dementia paralytica was regarded as a progressive incurable malady which almost inevitably led to death.

The empiric origin of non-specific therapeutic treatment in this condition was suggested by the old psychiatric observation that mental diseases were at times favorably influenced or cured by an inter-current febrile disease. The credit of introducing and developing this line of treatment is due to Wagner-Jauregg, of Vienna.

Hippocrates and Galen and Boerhave and Sydenham recognized the fact of the healing influence of febrile diseases on the course of psychoses. Various infectious processes such as typhoid fever, typhus, malaria, cholera, variola, erysipelas, scarlet fever, measles, pneumonia, and chronic pyogenic affections were known to produce a favorable influence.

It seems that Rosenbloom, of Russia, in 1874 and 1875 observed four cases of striking improvement of psychoses after intermittent fever, six after typhus and twenty-two after recurrent fever. There were eleven cures and three improvements. It is not clear that any of Rosenbloom's cases, however, were paresis.

But it was Wagner-Jauregg's prolonged and systematic observations and experiments beginning in 1883 which finally established the efficacy of malarial infection. Furthermore, the stimulus for further research came from an article by him in 1887, entitled "On the Influence of Febrile Diseases on Psychoses." (WAGNER-JAUREGG: "Über die Einwirkung fieberhafter Erkrankungen auf Psychosen," *Jahrb. f. Psychiat. u. Neur.*, Bd. 7, 1887.) He regarded favorably

intermittent fever, erysipelas and recurrent fever as processes which could be artificially induced.

After having tried with variable results tuberculin, tuberculin with mercury, Bezredka's polyvalent typhoid vaccine, staphylococcic vaccine, erysipelas inoculation and other methods, Wagner-Jauregg began malarial inoculation in 1917. Since that time, many thousands of cases have been treated by this method in almost all parts of the world.

The results in a general way are in accord with those treated by Wagner-Jauregg and Gerstmann. Speaking broadly, one-third or more of the patients go into good remissions and a large percentage of these are enabled later to resume work. About one-third have partial remissions, some of these later passing into complete remissions. Finally, about one-third are not improved.

In a general way, inoculated malaria is attended with a mortality of about 8 per cent., and it depends much upon the selection of cases. The duration of the remissions is not yet definitely known. Some patients have been back at their work now for nine or ten years. The best results with therapeutic malaria are obtained in paresis. Generally speaking, malaria is distinctly less valuable in tabes dorsalis than in paresis. Nevertheless, some very good results have been reported.

Lancinating pains and gastric crises are usually made worse during the course of the paroxysms, but a great improvement takes place later. It would appear that improvement or disappearance of gastric crises and lancinating pains occurs in about 50 per cent. or more of cases. Ataxia is usually not much influenced, but occasionally the improvement is striking. Bladder and rectal disturbances often yield to the treatment. In our own cases a relapse of gastric crisis occurred in several patients, an observation noted in an undetermined proportion of cases by others.

Speaking broadly, malarial inoculation may be recommended in appropriate cases of tabes.

Malarial inoculation has been fairly extensively used in early syphilis by Kyrle and by Vohwinkel, preceded and followed by courses of the arsenobenzenes. In view of the excellence of results obtained by approved medicamentous measures, this treatment

should not be employed as a routine in early cases but should be reserved for special conditions.

I should say that malarial inoculation is indicated in paresis, certain cases of tabes dorsalis, in some cases of irreducible Wassermann reaction, and in cases in which persistently pathologic alterations in the spinal fluid have not yielded to other vigorous antisyphilitic measures. We secured a brilliant and complete cure in an early arthropathy of the metatarsal bones, complicating a resistant cerebrospinal lues.

What are the contra-indications to malarial inoculation? The presence of a large aneurysm or marked degeneration of the myocardium would constitute absolute contra-indications. Aortitis need not deter one from this treatment. Great obesity would constitute a relative contra-indication. A complicating tuberculosis should demand careful consideration before malarial treatment is instituted. Advanced age (over sixty-five) usually contra-indicates malaria, and the likelihood of success is lessened in old people. "Galloping paresis" does not do well under this treatment, and likewise far-advanced cases, and senile cases and juvenile paresis. Severe nephritis would also cause one to veto malarial treatment.

The serologic improvement in the blood and spinal fluid is evident to the fullest extent as a rule only after six or nine months, although pleocytosis and globulin in the latter are largely reduced. There is usually a parallelism between clinical remission and a regression or arrest in the anatomic cerebral processes, as has been determined on persons dying of intercurrent disease. Remarkable changes are observed to have taken place. Furthermore, spirochetes can rarely be found in the brains of paretics after malarial treatment, although they can usually be demonstrated in two-thirds of the untreated cases.

Sodoku or *Rat-bite Fever* was introduced by Solomon and his associates (SOLOMON, BERK, THEILER, AND CLAY: "The Use of Sodoku in the Treatment of General Paralysis," *Archiv. of Int. Med.*, vol. 38, p. 391, 1926) as a method of febrile treatment of paresis. As a therapeutic method, it has according to Solomon theoretical possibilities equal to malaria. It is too early to evaluate this treatment but it is doubtful whether it will come into general use.

Plaut and Steiner (PLAUT AND STEINER: "Recurrent Infection in Paretics," *Zeitschr. f. d. Gesamt. Neurol. u. Psych.*, No. 13, 1919) in 1919 tried the effect of *Recurrent Fever* in paresis, influenced to some extent by the biologic parallelisms between the two causative parasites. In general the theoretic expectations of Plaut and Steiner, particularly as regards the immunity relationships, have not been fulfilled. Most authors agree that the results are far inferior to those achieved by malaria.

Kunde, Hall, and Gerty (KUNDE, HALL, AND GERTY: "General Paralysis: The Effect of Non-specific Protein Therapy on the Blood and Spinal Fluid," *J. A. M. A.*, vol. 89, p. 1304, 1927) published in 1927 the results of the use of *intravenous typhoid vaccine* in paresis. Twenty-one out of forty-nine cases attained a good state of remission. O'Leary, in 1928, treated twenty-six cases of neurosyphilis by this method. The treatments were less debilitating than after malaria, but the remissions were slower in appearing.

In 1929, Kemp and Stokes (KEMP, AND STOKES: "Fever Induced by Bacterial Protein in the Treatment of Syphilis," *J. A. M. A.*, vol. 92, p. 1737, 1929) treated sixty-five cases of syphilis with mixed typhoid vaccine. Of this number two were paretics and they were not materially benefited by six to sixteen fever treatments. A group of approximately forty-six per cent. of apparently irreducible blood Wassermann reactions in various stages of syphilis were reversed by fever therapy alone or combined with arsphenamin treatment.

Schelm (SCHELM: "Typhoid Vaccine in the Treatment of General Paralysis," *U. S. Vet. Bureau Med. Bull.*, vol. 6, No. 7, July, 1930) used typhoid vaccine in twenty cases of paresis. Six showed definite improvement, four moderate improvement, and the remainder were uninfluenced. In 50 per cent. of the cases the blood Wassermann became negative, and in 15 per cent. the spinal fluid Wassermann.

The therapeutic mechanism of fever in neurosyphilis is not known. Many theories have been advanced. Gerstmann remarks: "One thing is sure. It is not the fever which is the important curative agency. The temperature elevation constitutes merely one—albeit an important—factor in the vital reaction." In our Research

Institute (SCHAMBERG, AND RULE: "Studies of the Therapeutic Effect of Fever in Experimental Rabbit Syphilis," *Archiv. Dermat. and Syph.*, vol. 14, p. 243, 1926) we were not able to protect rabbits against subsequently inoculated syphilis by the intratesticular injection of malarial blood, but we were uniformly able to do so by giving them fourteen very hot baths, raising their temperature an average of 4° F. We were able to demonstrate that spirochetic emulsions heated in physiologic salt solution on a water bath to 40° or 41° C., although showing actively motile spirochetes, either failed to induce syphilis or did so only after a greatly prolonged incubation period. Schamberg and Tseng (SCHAMBERG, AND TSENG: "Experiments on the Therapeutic Value of Hot Baths with Special Reference to the Treatment of Syphilis," *Amer. Jour. Syph.*, vol. 11, No. 3, p. 337, 1927) were able to demonstrate that patients with secondary or tertiary syphilis showed an appreciably favorable effect upon the eruption as a result of extremely hot baths. Mehrtens and Pouppirt (MEHRTENS, AND POUPPIRT: *Archiv. of Neur. and Psych.*, vol. 22, p. 700, 1929) gave 900 extremely hot baths to seventy patients during a year and a half and noted favorable results in tabes and paresis.

These results persuade me to believe that the temperature is the dominant or perhaps the sole factor in the fever treatment of syphilis.

And now a new and most important method of treatment has been developed. Neymann and Osborne of Chicago (NEYMANN, AND OSBORNE: "The Treatment of Dementia Paralytica with Hyperpyrexia Produced by Diathermy," *J. A. M. A.*, vol. 96, No. 1, p. 7, 1931) have published this year results in the treatment of paresis with diathermy fever. Twenty-five cases were treated, of whom 66 per cent. went into clinical remissions. Eight per cent. were *markedly* improved. Sixteen patients, or 64 per cent., made an absolute social adjustment and were able to maintain themselves outside the Psychopathic Hospital without supervision.

In the discussion on the paper, Doctor Koenig, of the Elgin State Hospital, stated that he had treated fifty patients by this method. Of the 48 per cent. of improved cases, 33 per cent. had returned to their former occupations. The incidence of improvement seems to be somewhat higher than after malaria. A temperature of 105° F. or more can be induced and can be readily

controlled. There is almost no danger to life from this method of treatment. One must carefully guard against burns by proper technic and careful surveillance. We are employing this mode of treatment and our early results are encouraging. There is relatively little prostration; an hour after the treatment some of the patients saunter about the wards. It will require a considerable period of time to evaluate this method of treatment and to effect comparisons between it and malarial inoculation.

When it is recalled that the making of a diagnosis of paresis was formerly tantamount to signing a death certificate, what great advances have been made!

THE NEWER ARSENICALS IN THE TREATMENT OF SYPHILIS*

THERAPEUTIC USE AND CONTROL OF REACTIONS

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THE discussion of newer arsenicals in the treatment of syphilis will be limited to three drugs, namely, bismarsen (bismuth arsphenamin sulphonate), acetarsone, otherwise known as stovarsol or spirocid, and tryparsamide.

Bismarsen was synthesized in 1925 by Raiziss and since then it has had clinical appraisal by several investigators. Bismarsen is given intramuscularly in doses of 0.2 gm. in four- to seven-day intervals. Two injections a week are preferable in early syphilis. Its action lies about midway between arsphenamin on one hand and bismuth on the other, and is in keeping with the modern trend of combined arsphenamin and heavy-metal therapy. Bismarsen is slower than arsphenamin or neo-arsphenamin in effecting a disappearance of cutaneous and osseous lesions of syphilis, but its effects are lasting and are accompanied by a low percentage of infectious mucocutaneous relapse. Papers by Stokes and Chambers, by O'Leary and Brunsting, by Kolmer and by Shivers up to a year ago all report favorably on the use of bismarsen in various phases of syphilis.

Very recently Stokes, Miller and Beerman have reported on five years' experience with bismarsen in all stages of syphilis. They find it especially adaptable to the treatment of early syphilis, and point out its particular virtues in the treatment of prenatal syphilis and cardiovascular syphilis. They found a very low incidence of treatment reactions, both local and general. The general reactions resulting from the use of bismarsen in the form of dermatitis, jaundice, and hemorrhagic accidents can be summed up by saying that these reactions occur much less frequently than with neo-arsphenamin or arsphenamin and when they do occur, the extent and severity of the reactions are less than with the other arsphenamins.

Bismarsen, then, lends itself favorably to treatment of all forms of syphilis, probably equal to combined therapy with neo-arsphen-amin and bismuth in early syphilis, slightly inferior to combined therapy in effecting the healing of cutaneous and bone syphilis and interstitial keratitis, and is often the drug of choice in the treatment of late syphilis in older subjects where treatment reactions would prove more dangerous, yet where the patient should receive active antiluetic therapy.

Tryparsamide has been used in the treatment of neurosyphilis for the last twelve years. Tryparsamide was first given in courses consisting of eight to twelve injections followed by rest intervals or in alternation with such drugs as mercury or bismuth.

Lorenz recently reported on 317 patients with neurosyphilis treated with tryparsamide and mercury salicylate with clinical recovery in 50 per cent. Of these 152 patients, 87 per cent. have remained well for five to six years. Comparing this group of well patients with a similar group of patients that did not recover, Lorenz drew the following conclusions: the patients that responded to tryparsamide therapy and remained well were on the average seven years younger, they had had the disease a shorter time, they presented greater symptomatic abnormality in the form of expansion, depression, mania, etc., they showed a greater gain in weight under tryparsamide treatment, neurologic signs of degenerative changes in the spinal cord were much less in evidence, and the spinal fluids of these patients showed marked variations from normal with a more rapid return to normal under treatment.

Lorenz warns against doses of tryparsamide of less than 1 gm. The dose usually given at each injection was 3 gms. The minimum number of injections was fifty at weekly intervals.

Taking the figures of Stokes and Wilhelm, Moore, Robinson and Keidel, Lorenz, Wile and Wieder, and Moore, Robinson and Lyman on serologic results obtained in neurosyphilis, and averaging up their percentages, the following results were obtained: blood Wassermann reactions were reversed in 41 per cent. of the cases treated and reduced in 12 per cent. Spinal fluid Wassermann reactions were made negative in 27 per cent. and reduced in 62 per cent. The spinal fluid cell counts were reduced to normal in 70 per cent. and improved in 25 per cent.; the globulin became normal in 32 per cent.

and was reduced in 24 per cent.; the colloidal gold curves in the spinal fluids became normal in 35 per cent. and were reduced in 42 per cent.

The past five years' experience with tryparsamide in the treatment of neurosyphilis has shown two outstanding facts to be true: (1) Tryparsamide should be given not in courses with rest intervals, but continuously week after week for at least one year before it is given up. (2) Tryparsamide therapy should be preceded by intensive antiluetic therapy in the form of an arsphenamin combined with either bismuth or mercury where possible.

In starting tryparsamide therapy, careful checks on the visual fields and acuity must be kept, particularly during the first ten to fifteen treatments. A 10 to 15 per cent. peripheral constriction of the visual field to white objects after tryparsamide injection is considered a contra-indication to further treatment, at least temporarily.

Acetarsone, otherwise known as stovarsol or spirocid, is the only arsenical which has any therapeutic effect on syphilis when given by mouth. This property alone makes it very adaptable to the treatment of certain types of patients, especially infants and children. Recently Raiziss in this country synthesized acetarsone in a very pure form. This product is much less toxic for experimental animals than the most optimistic reports of earlier continental investigators.

Clinically, acetarsone has been used by continental clinicians in the treatment of syphilis, especially in infants and children, with great success. Oppenheim, of Vienna, is conservative in dosage prescribed. He gives from 10 to 200 milligrams daily in a single dose to infants, depending on the age. The drug is given in milk or weak tea on an empty stomach, for three to five days, followed by a rest period of the same length. He feels that low dosage and broken intervals are responsible for his low incidence of toxic reactions. Lesser of Berlin uses higher doses and gives the drug daily until the blood Wassermann is negated. This constitutes the first "kur." After a short rest period a second kur is given equal in total dosage to the first. He has obtained excellent therapeutic results with this method. Both Lesser and Oppenheim advocate combining bismuth or mercury with acetarsone if interstitial keratitis is present.

Acetarsone is not restricted to the treatment of syphilis in infants and children. It can be used in adults. Now that the drug is

available in a highly purified form, it should soon become recognized as a valuable drug in the treatment of syphilis.

THE PREVENTION AND CONTROL OF TREATMENT REACTIONS

The Jarich-Herxheimer reaction, or accentuation of the diseased process following the first injection of an arsphenamin, and the therapeutic paradox, *i.e.*, the accentuation of symptoms and signs as a result of fibrosis from too rapid healing sometimes seen in cardiovascular syphilis and hepatic syphilis, are too often forgotten. They may both be avoided as a rule if the patient is first prepared with slower acting drugs, such as bismuth or mercury and iodides, before starting treatment with one of the arsphenamins.

To inject slowly when giving neo-arsphenamin intravenously is the single best refinement in technic used to minimize treatment reactions, notable gastro-intestinal reactions, and nitritoid crises. Using freshly prepared neo-arsphenamin which has *not* been oxidized by bubbling throughout the mixing process is also an essential but treatment reactions occur more frequently when the solution is injected rapidly than when it is injected very slowly. Heyman and Hirshfeld have described a syndrome designated as "speed shock" resulting from the rapid intravenous injection of fluids. This syndrome includes a fall in blood-pressure and respiratory irregularity and is dependent solely on the rapidity of the injection.

After giving intramuscular injections of either soluble or insoluble preparations such as bismuth, bismarsen, or mercury, vigorous deep massage of the buttock immediately after the injection, followed by hot sitz baths to be taken the same night by the patient at home, does a great deal to minimize the discomfort and to preserve the injection site for the large number of injections that are usually required.

In controlling some of the less serious but very disagreeable reactions resulting from intravenous injection of the arsphenamins, several methods have been found of value. Giving 50 milligrams of ephedrin a day for two days preceding the injection often entirely eliminates gastro-intestinal upsets. Large doses of atropin sulphate hypodermically, 1/75 to 1/100 grain just ten or fifteen minutes before the injection, giving the arsphenamin in divided doses (Bezredka technic), or the use of 10 cubic centimeters of calcium

gluconate intravenously or intramuscularly just prior to the treatment, often prevents the gastro-intestinal reactions and nitritoid crises. A new drug recently brought out by Schamberg for the treatment of arsphenamin dermatitis is calcium thiosulphate. The highly rational combination of calcium with the detoxifying action of the thiosulphate radical may prove to be an excellent prophylaxis for treatment reactions from arsphenamin other than arsphenamin dermatitis.

Arsphenamin dermatitis is probably the most frequent of the more serious complications resulting from the injection of one of the arsphenamins. Experimental evidence in support of the hypothesis that arsphenamin dermatitis results from an acquired sensitization to a radical common to all of the arsphenamin preparations is accumulating.

The patch skin test done with neo-arsphemamin solution has recently been shown to detect manifest hypersensitiveness to the arsphenamins. If a patient gives a history of having had an arsphenamin dermatitis, or if he develops an eruption while under treatment with an arsphenamin, a patch test should be done before continuing arsphenamin treatment. If the patch test is positive no further treatment with an arsphenamin should be attempted. If the patch test is negative further treatment with an arsphenamin may be carried out.

THE NEWER CONCEPTIONS OF THE DIAGNOSIS AND TREATMENT OF EARLY SYPHILIS*

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THE trend of modern medicine is to concentrate every effort on early diagnosis and immediate treatment, and in no disease is the issue so vitally paramount as in the field of syphilis. Studies indicate that there is a 35 per cent. increased possibility of permanent arrest of a syphilitic infection when it is recognized in the primary stage prior to the development of a positive Wassermann reaction. While many patients first report too late to achieve this ideal, the following diagnostic hints are suggested to assist in the recognition of primary syphilis:

(1) Time has shown the wisdom of abandoning clinical impressions in the interpretation of the suspected lesion. The chancre has no invariable morphologic characteristics. While time-honored clinical criteria as indolence, induration, and associated adenopathy are the suspicion arousers of syphilis, particularly at an extragenital site, they are never in themselves conclusive and the burden of proof under all conditions rests on laboratory procedures.

(2) The darkfield examination for the Spirochaeta pallida has been shown to be the only way to identify early syphilis in the seronegative phase. Some experience is necessary to distinguish the pallida from saphrophytic spirochetes and darkfields from mouth lesions are notoriously unreliable except under expert interpretation.

(3) In the presence of a negative darkfield, the syphilologist advises the examination of the secretion secured by aspiration from the base of the lesion or enlarged satellite lymph-glands. It is advisable to reëxamine the serum from the lesion itself after twenty-four hours' intermittent application of salt-solution dressings. A base-line blood Wassermann test should be made at the first visit.

(4) In cases negative to darkfield by direct examination as well as aspiration the blood Wassermann should be repeated at weekly

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intervals for two months and then monthly for an additional two months. It is to be expected that about 14 per cent. of those previously negative to darkfield will yield positive blood tests.

(5) The diagnosis of chancroid should be made only in retrospect after a four months' examination for syphilis has yielded negative results. Local treatment on the suspected lesion may be used after a twenty-four hours' futile attempt to prove the case by darkfield.

(6) Banal genital lesions as scabies and herpes in exposed persons may be the portals of entry for the spirochete and such cases should not be dismissed from observation without final reëxamination for syphilis.

(7) Gonorrhea may mask an early syphilis with an insignificant, a meatal, or an intra-urethral primary, hence every gonorrheal infection should have the benefit of a Wassermann follow-up. Twenty per cent. of patients with late syphilis when questioned concerning antecedent venereal infection give simply a gonorrheal history.

The diagnosis of early syphilis then requires more laboratory insight than clinical acumen. It demands a deeper understanding of the problem by physician as well as the laity if the optimum conditions for darkfield are to be realized, namely, the examination of early, clean, untreated lesions. Since 65 per cent. of all genital lesions are due to syphilis, every effort should be made to conclusively establish the presence or absence of this infection before a diagnosis of a relatively banal condition is accepted. Laboratory means of diagnosis offer the only trustworthy approach to the entire issue.

When one turns to the problem of the treatment of early syphilis, dogmatism must give place to conservatism, for differences of opinion as to drugs, methods and aims make it impossible to define a standard, universally acceptable treatment program. From the great variety of treatment systems that have been proposed, however, certain principles have recently become more clearly defined and are generally accepted as basic to the scientific, intelligent management of the disease.

(1) Most authorities believe an arsphenamin to be an essential part of the treatment in early syphilis. Jeanselme attributes a part of the increased incidence of syphilis in France to the over-enthusiasm for bismuth and the relative abandonment of the arsphenamins. While most syphilologists concede the therapeutic superiority of original arsphenamin, the technical difficulties associated with its

preparation and use have enhanced the practicability of neo-arsphen-amin, which has become the drug of choice except in a few of the larger clinics.

(2) The early intensive massing of an arsphenamin, as advocated by Pollitzer, has been modified to three injections of an arsphenamin during the first week or ten days of treatment. The studies of Stokes and Becker showed a 10 per cent. lessened incidence of relapse when treatment was pushed during this period. Most authorities at present discredit the advisability of awaiting the appearance of secondaries in order to establish an active immunity and insist upon the treatment of syphilis the moment the diagnosis is accurately established.

(3) European practice has long indicated the tendency toward more conservative dosage. Schamberg has been the recent American spokesman for this modification. Large doses definitely endanger tolerance, burden the eliminative organs, and increase complications. Massive doses cannot crush a syphilitic infection; it must be gradually worn out through a long siege of less intensive therapy. It is inadvisable to exceed 0.4 gm. of original arsphenamin, or 0.6 gm. of neo-arsphenamin. Women, particularly, and many men do well on the repeated use of 0.45 gm. of neo-arsphenamin.

(4) Many authorities believe that neo-arsphenamin is most effectively given at a three- to five-day interval and private care usually permits such a treatment schedule. In clinic practice a weekly treatment interval is frequently more practical.

(5) The minimum amount of arsphenamin necessary for the management of early syphilis is from thirty to forty injections providing clinical and serologic response is satisfactory. The studies of Moore and Kemp and the recent work of Stokes, Besancon, and Schoch, and that of Stokes, Cole, Moore, O'Leary, Parran and Wile show conclusively that relapse is proportional to the number of arsphenamin injections given. In patients with early syphilis receiving from one to eight injections of arsphenamin, relapse occurred in from 75 to 90 per cent., while it diminished to 0 per cent. in a group of seronegative darkfield positive cases receiving from twenty-one to forty injections of arsphenamin.

(6) The present trend is toward the simultaneous administration of an arsphenamin and a heavy metal, usually bismuth. Colonel Harrison, of the British Ministry of Health, believes that this con-

current use produces synergistic enhancement of the spirillicidal and resistance-stimulating properties of the two drugs and definitely protects against neurorecurrence. While overlap with a heavy metal rather than coincidental administration is permissible with original arsphenamin, many authorities no longer consider it adequate to give a heavy metal merely in alternating courses with neo-arsphenamin.

(7) No complete rest intervals from treatment are allowable the first twelve to eighteen months of the infection. The arsphenamin phase of the treatment is given in courses of twelve to fifteen injections with periods of four weeks' rest between courses, during which time bismuth is still continued.

It is generally believed to be advisable to treat every case of early syphilis to an empiric standard irrespective of serologic findings. While periodic blood Wassermann reactions are essential as an index of therapeutic response, their change from positive to negative should never be an indication for decreased intensity of treatment or lessened watchfulness for subsequent relapse.

The conception of the short abortive course for cure is obsolete and once a patient is committed to the diagnosis of early syphilis, treatment must be continued uninterruptedly to the maximum determined by large experience and judgment. The report of Chargin based on a group of patients on irregular and desultory treatment is at present unsupported by studies of a similar nature and is not a convincing argument against the prolonged intensive method of treatment generally advised.

(8) A spinal fluid examination after six months of treatment is essential to evaluation of prognosis and duration of therapy. In general, in the presence of a negative spinal fluid, treatment should be continued for at least a year from the time of blood Wassermann reversal to negative providing such serologic findings are permanent. Abnormal spinal fluids demand a therapeutic approach not pertinent to this paper.

The adequate treatment of early syphilis then demands the long-continued, uninterrupted combination of an arsphenamin and a heavy metal given in conservative dosage and administered simultaneously or at least with overlap. Anything short of this intensive approach paves the way for relapse and the tragic late effects of uncontrolled visceral involvement.

THE PREVENTION AND TREATMENT OF PRENATAL SYPHILIS

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A DISCUSSION of prenatally acquired syphilis introduces a more hopeful note than can be found in a review of any other phase of the disease. Prenatal syphilis can, in the opinion of many European and American observers, be eradicated.

I shall consider the diagnosis of prenatal lues but briefly; the past decade has seen little added to the long-known diagnostic landmarks. The more adequate Kolmer Wassermann and Kahn precipitation reactions have given us more sensitive technics along with a lower percentage of false positives in the pregnant woman. Increasing refinement of roentgenologic technic and greater surety of interpretation in the light of syphilis have been the means of illuminating obscurities in the important groups of bone lesions.

The old concept of an almost uniformly positive blood Wassermann reaction in infected infants during the first two months of life must be abandoned. A single negative Wassermann obtained shortly after birth is apparently without value in excluding syphilis. Boas and Marcus have shown conclusively that the development of a positive blood reaction may be delayed until the sixth month, or even longer. The cord Wassermann is even more uncertain and inadequate. Wells reports six infants with negative cord Wassermanns in which congenital lues developed within the first month.

Consideration of the early lesions of prenatal lues will be limited to mere mention of the tendency to localize in the circumoral region, the palms and soles, and the anogenital region; and the frequency of bullous lesions, and the importance of the enlarged spleen in the young infant. In any suspected case, blood examination need not be postponed because of the bugaboo of venepuncture in the infant. The adaptability of modern serologic technic in the utilization of as little as .05 cubic centimeters of serum for the Kline test

makes the obtaining of sufficient blood a simple procedure; a stab wound is usually quite adequate.

The outstanding late lesions may be catalogued briefly; first, interstitial keratitis, the ranking sign of prenatal lues, encountered, according to all recent tabulations, in at least half of all late untreated cases; second, the dental changes, particularly hutchinsonian incisors and mulberry molars; and third, changes in the bones, especially around the elbow and knee and in the tibia, of the nasal septum and frontal bones. These are the bulwarks of the physical diagnosis of late prenatal lues. The complete hutchinsonian triad, commonly encountered in the classroom, seems rare in practice. The validity of eighth-nerve involvement as a pathognomonic sign has been challenged.

The literature contains an increasing number of nondescript signs enthusiastically advanced as pathognomonic of prenatal syphilis. Almost without exception it would seem that these signs are indicative of maldevelopment in which syphilis may or may not be a factor. An example in point is the complete collapse as a diagnostic point of the Carabelli tubercle. A conscious effort to keep syphilis in the diagnostic foreground in the general examination of every maldeveloped child relieves these debatable signs of their sole function as suspicion arousers.

What must be the focus of attack in the promised eradication of congenital syphilis? Recognition and treatment of the disease in the child most certainly will not attain this end, and attention at once shifts to the source of the child's infection, the syphilitic mother. First, then, we must advocate an attempt at control of conception in the syphilitic female, a measure which Hoffmann has emphasized strongly.

The second and most feasible point of attack is early diagnosis and adequate treatment of the syphilitic pregnant woman. Hoffmann states flatly that adequate early treatment will assure a non-syphilitic child. At the Royal Free Hospital of London there have been no stillbirths due to lues, or syphilitic infants delivered of adequately treated mothers in the past five years. Contrast this experience with the figures reported from England and Wales in 1923 when, of 178,000 fetal deaths, 35,000 or slightly over 20 per cent. were due to syphilis. The outstanding series of Boas and Gammeltoft demon-

strate the effect of treatment most graphically. Of luetic mothers receiving no treatment, 96.5 per cent. of the infants were syphilitic and only 3.5 per cent. healthy. Of the mothers receiving only mercury before pregnancy, 90 per cent. of the infants were infected. Of the mothers receiving an arsphenamin before pregnancy, 80 per cent. delivered infected infants. Of the mothers receiving mercury only during pregnancy, 72 per cent. of the children were infected; of those receiving arsphenamin before and mercury during pregnancy, only 27 per cent. of the children showed evidency of syphilis; and of the mothers receiving arsphenamin during pregnancy but 17 per cent. were infected.

Treatment of the pregnant syphilitic woman seems to be tending away from too conservative methods. Vigorous use of the arsenicals in conjunction with bismuth is essential. The figures of Boas and Gammeltoft would indicate that the arsenicals, because of their proven spirocheticidal powers, should be continued to term. It should be kept in mind that treatment at this time is directed primarily toward protection of the foetus; the resistance of the mother to her syphilitic infection is already at high tide by virtue of her pregnancy.

At what period in pregnancy does treatment become less effective as regards protection of the foetus? The best results assuredly will be obtained by treatment from the beginning of pregnancy. Many reports indicate, however, that rapid decline in effectiveness is not noted until after the fifth month of pregnancy. During the last month, treatment probably serves little purpose other than protection of the obstetrician from operative infection.

In view of the overwhelming chance for infection of the infant of untreated mothers with early active or latent syphilis, it is a matter for serious consideration as to how the infected infant of a mother receiving inadequate treatment late in pregnancy shall be handled. Should the probable infection of the infant be regarded as cured or latent? The practice in most American clinics is to await the development of active signs in the child before initiating treatment. There are no data available indicating actual passage of antisyphilitic medication to the body of the foetus and it seems hardly logical to regard the almost certainly infected infant of a mother with early lues as cured. At the Welander homes for syph-

ilitic children in the Scandinavian countries, where the opportunity for long-continuous observation of the syphilitic mother and child is unparalleled, it is the custom to continue treatment of the infant after birth regardless of the presence or absence of luetic signs.

The treatment of prenatal lues has undergone a marked increase in effectiveness with the development of arsenicals suitable for intramuscular injection. Sulpharsphenamin has proven its value unquestionably in the experience of Osborne and Putnam and of Schamberg and Wright. Bismuth arsphenamin sulphonate is not yet completely evaluated but is showing promise in the treatment of latent prenatal lues at the University Hospital. Osborne and Putnam state that infants with active syphilis at birth or with bulbous lesions seldom recover under any treatment. Treatment of the infant with a positive blood and no physical signs may be fairly definitely systematized, subject, of course, to the restrictions of individual reactions to treatment. The system in vogue at the University Hospital consists of weekly or twice weekly injections of bismarsen varying from 10 to 100 milligrams. A sulpharsphenamin system used by Schamberg and Wright consists of alternate courses of sulpharsphenamin and bismuth or mercury rubs. Bismuth, although far preferable to mercury, is often not well tolerated locally in very young infants and for this reason mercury inunctions must be substituted. Neo-arsphenamin may be substituted for sulpharsphenamin in older children. Its administration by the superior longitudinal sinus in infants is absolutely unjustified and it is doubtful whether the intraperitoneal injection method suggested by Yampolowsky will find wide favor.

In view of the enthusiastic endorsement of stovarsol or spirocide by mouth at the German Dermatological Congress in 1929, some mention must be made of this method. The drug has long been neglected because of alarming toxic properties in the older preparations, but Levaditi, Hoffmann, and Kerl consider it of unquestioned value in the treatment of the luetic infant or the protection of the suckling child of a syphilitic mother. American clinical experience with the drug has been extremely meager.

Interstitial keratitis, as the most frequent and damaging lesion of prenatal lues is, in the opinion of most syphilologists, an indication for the almost simultaneous use of every device of modern syphilo-chemotherapy. It is the outstanding emergency of prenatal lues.

Arsphenamin and bismuth should be given concurrently in maximum dosage in conjunction with iodides by mouth. Non-specific proteins are often valuable. The lesion is capricious and far from satisfactory in its response, but intensive treatment will often prevent involvement of the unaffected eye. Osborne and Putnam report 30 consecutive cases restricted to unilateral involvement by a concurrent sulpharsphenamin-bismuth system.

The frequency of a positive spinal fluid in prenatal lues varies from 20 to 25 per cent. in recent tabulations. Tryarsamide has not been completely evaluated. Various European reports speak highly of the usefulness of malarial inoculation when a positive spinal fluid is uncovered, and all observers agree that the infection is well borne in children. The value of routine early spinal fluid examination goes without saying. A full-blown juvenile paresis apparently still presents a hopeless prognosis.

In conclusion, if I can leave one thought of this brief presentation with you, let it be this, that control of conception in the syphilitic female and early diagnosis and adequate treatment of the disease in the pregnant woman far outweigh in importance any other consideration in this phase of syphilis.

SYPHILIS AS A PROBLEM IN PREVENTIVE MEDICINE

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FOLLOWING the summarizing purpose of this symposium, it is my task to attempt to evaluate five years' gain in knowledge of public health, epidemiologic and preventive problems in syphilology. Recent surveys by the United States Public Health Service indicate that there are 643,000 cases of syphilis constantly under medical care in this country, and 423,000 new infections annually. The amount of latent, unrecognized syphilis can only be guessed at. Highman estimates that there are not enough physicians in the country to place them all under medical care. A series of surveys to determine upward or downward trend has led to a considered statement recently made by Dr. Thomas Parran, formerly head of the Division of Venereal Diseases of the United States Public Health Service, and now Health Commissioner of the State of New York, which must come to Americans with a shock. Though syphilis is decreasing rapidly throughout most of Europe, it apparently is not decreasing in this country. It is said to have been reduced in incidence in Belgium, for example, to about one-tenth of its former prevalence. Why not here? In the registration area of the United States since 1920 there have been half a million, or nearly one-third more cases of syphilis than of diphtheria; three times as much syphilis as smallpox; and five times as much syphilis as typhoid fever. There have actually been 35,000 more cases of syphilis reported than of scarlet fever; 79,000 more than of all forms of tuberculosis, to say nothing of unreported cases.

Syphilis is, then, a critical, perhaps the critical health problem of our time. The difficulty of epidemiologic interpretation is conceded and Sequiera has recently reviewed the critical aspects of the questions involved. But the figures from England, Germany, Belgium and Scandinavia are on the side of expectancy based on the

logic of the situation. Infectiousness is controllable by modern treatment when applied by organizational methods, under the direction and control of the state. Colonel Harrison, the benevolent despot of British venereology, has presented both indirect and direct evidence to indicate a decrease of five-sixths in the incidence of new infections with syphilis in Great Britain since 1918. A colossal survey of the German situation, reported by Jadassohn and others, indicates a reduction in gonorrhea and congenital syphilis between 1919 and 1927 of about one-third; in primary and secondary syphilis, two-thirds; in chancroid, nine-tenths. Such horizontal reductions raise important technical questions and some doubts impossible to consider here. In the Scandinavian countries there is now so little syphilis that specialists are said to be forsaking the field.

Your essayists have indicated the many uncertainties that beset the curability of syphilis in the individual patient. Between the experimental evidence for superinfection; the contestability and rejection, in recent studies, of the overwhelming majority of reported reinfections in man; the effect of such work as Eagle's in increasing the sensitivity of serologic tests to the point where "cured" cases appear merely as arrest; and of such spirochete-hunting researches as Warthin's, which illuminate the remarkable symbiosis of the Spirochaeta pallida and man, it is an open question whether treatment does more than induce latency. Fortunately, for the time being at least, suppression of syphilis by sterilization of contacts and carriers has a better outlook. It is the control of syphilis by treatment of the infectious person that has contributed to the declines in incidence above described.

What are the essentials of a program for the extinction of syphilis? Seriatim, they are as follows:

(1) *Detection of the disease before the blood serologic tests become positive.* Nine-tenths of laboratory research since 1907 has been headed in exactly the opposite direction. As a result, we have today nothing but the technically difficult and inaccessible dark field with which to grasp our "golden opportunity" for the arrest of the disease.

(2) *Detection of the carrier by simplified routine tests,* usable in all well-equipped medical offices, on all patients, as are urinalyses and blood counts. The development of the highly efficient Kline slide

precipitation tests in this direction is most hopeful and important, the positive result to be checked with complement fixation and precipitation tests combined.

(3) *Tracing of the source of infection.* In this the practitioner is helpless, rather than indifferent, and needs state aid.

(4) *Unwavering adherence to the arsphenamins* in the treatment of syphilis during the first five years of its course, and their application without delay and in spite of the blandishments of bismuth, to the chancre and secondaries as soon as diagnosed. The French are apparently paying the price, in part, of a substitution of bismuth for the arsphenamins in early syphilis. The most massive case material yet analyzed, which was presented before the International Congress at Copenhagen last August from American sources, apparently proves beyond further doubt that it is the arsphenamins and not the heavy metals that control the infectiousness of syphilis.

(5) *Prevention of infectious relapse.* The investigation just referred to indicated also just how much arsphenamin and heavy metal are called for in the reduction of early syphilis to non-infectious latency. The critical point falls between the fifth and the ninth "606" injection, and twenty injections of each drug may be regarded as a public health minimum.

(6) *Adherence to system.* Individualization is for late, not for early syphilis. Within the next several years, it is expected that the League of Nations Health Organization studies of syphilis treatment, of which the American investigation, conducted by five University clinics, the United States Public Health Service and the Millbank Fund is a quasi-independent part, will propose standard systems, based on world experience, with which every case of early syphilis can be treated by existing means to secure maximum preventive and curative results.

(7) *Simplification and reaction prevention in treatment methods.* The pyramiding of complexities, technical difficulty and painful and dangerous reaction represented by modern treatment methods is easily the most serious drawback to their effective application today. Toxicity reduction at the expense of therapeutic effect; the rush into popularity of specialists' methods such as fever as against tryparsamide therapy; the critically essential spinal puncture, poorly and rarely performed; the pain of improperly given and irritating

intramusculars, the penalties of maladministered arsphenamins, have kept practitioners' treatment at a low level of effectiveness. The universalization of effective treatment must come through simplification of method as well as better technical training of the physician, present and to come.

(8) *Lower costs.* Syphilotherapy shares with medicine at large the critical problems of this field. Their adjustment cannot be discussed here.

(9) *Centralized* versus *individual treatment control.* The methods of attack which are now producing reductions in incidence of syphilis abroad are centralized. They depend upon the clinic as against the general practitioner. They are the epitome of state medicine, as in Great Britain; or represent socialized insurance medicine, as through the Krankenkassen in Germany. They have back of them an influential body of public sentiment, organizations like the Social Hygiene Council, government-subsidized, in Great Britain; the Gesellschaft für Bekaempfung der Geschlechtskrankheiten in Germany. An order from a director sways a whole movement, determines along modern lines the entire policy of a nation with reference to an infectious disease. In the United States and France, medical practice in this field is still individual. Jeanselme summarized as contributory to the unenviable record of France, the vagary-chasing of the practitioner, trying this drug and that method on an "I-had-a-case" basis; the disposition of the doctor and the patient to unite on insufficient and symptomatic treatment; and the mistaken use of bismuth to replace arsphenamin in early syphilis. Why the almost equally unenviable record of this country? In part, perhaps because, in spite of 671 clinics for venereal disease, of which 445 are state aid, 70 per cent. of the syphilis in the United States is in the care of general practitioners. Fortunately for the hope of an American solution outside of socialized medicine, we have a body of semi-specialists, who treat 60 per cent. of our venereal disease along lines that can be improved, and almost undoubtedly will be. The question today is: "Will they be improved fast enough, and can the sum total of their improvement equal the performance of organization, clinics supported by the state, by insurance agencies, by private initiative?" The American situation is marked today by the difficulty of popularizing complicated modern methods with general practition-

ers and the lethargy of a public unaroused and uneducated to the magnitude and gravity of the venereal disease problem. Private corporate initiative is invading the field, amid denunciations from an organized medicine which will not organize itself to meet this situation. A great pussyfooting, under various names, toys with or evades critical medical issues, leaving disease prevention too often to its fate. The pharmaceutical manufacturers, every man for himself, strive, compete, and too often foist. A scattering of voices raises an appeal for an American solution; the practitioner, aided by the state but not submerged by it, in the control of syphilis through the individual treatment of the infected person to non-infectiousness, by his individual physician. Can we not preserve a distinguished individualistic tradition in this over-organized world? A far-sighted public health officer, the Commissioner of Health for Massachusetts, in the sixth Hermann Biggs Memorial Lecture before the New York Academy of Medicine on May seventh. His title is almost clairvoyant in its suggestiveness for the situation we have been discussing in the past ten minutes. "Will the Practitioner Practice Preventive Medicine?" In syphilis, let us hope and believe that he will.

RECENT EXPERIMENTAL CONTRIBUTIONS TO SYPHILIS

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GENERAL conclusions of important studies in the field of experimental syphilis only will be reviewed in this paper.

One phase of experimental study of syphilis confined largely to the infection in the rabbit concerns the question of immunity. From the studies of many investigators, there is no satisfactory evidence of a humoral rôle of immunity in syphilis. Attempts to produce active immunity in man or in the lower animals, by injecting filtrates of syphilitic tissue, killed and living syphilitic virus and cultures of Spirochaeta pallida have been generally unsuccessful.

Attempts at passive immunization with the serum of immune persons, or with the serum of animals infected with syphilis, or treated with dead culture of Spirochaeta pallida have proved fruitless.

There is little status to the immunologic rôle of such antibodies that have been demonstrated in the serum of syphilitic patients, or of animals experimentally infected with syphilis. A number of workers have demonstrated agglutinins in the serum of rabbits after injecting them with culture of Spirochaeta pallida. In these instances, however, no agglutination occurs with virulent organisms. Eberson demonstrated immune bodies in the serum of patients with latent syphilis. Employing the same technic, his results have not been confirmed by Manteufel, Richter and Worms, Kolmer and Rule nor by myself. It therefore appears that the mechanism in immunity in syphilis is largely cellular.

Heretofore, the conception of immunity against second attacks of syphilis was in accordance with Neisser's view that resistance to re-infection and latency are due to non-reaction of the tissues or "anergie," as Neisser called it, a condition said to depend entirely on the continued presence of the virus. Conversely, the appearance

of a second chancre is commonly held to be proof that the first infection was eradicated.

This conception has been somewhat altered through the work, notably of Kolle, Brown and Pearce and Chesney. Their studies have shown that the response of a syphilitic rabbit to a second infection with syphilitic virus depends upon whether a heterologous or homologous strain of pallida is used for a second inoculation, and the time at which the inoculation is made. Up to the sixtieth day of the infection in rabbits, a second chancre can usually be produced with homologous strain, but rarely after the ninetieth day. Treatment of the animal modifies this occurrence. If treatment is begun early in the course of the infection, a second inoculation is possible. If treatment is postponed until after the ninetieth day, the animal will not acquire a second chancre when inoculated with homologous strains. In animals thus treated and re-inoculated, Chesney and Kemp injected different organs of these animals into other rabbits, with negative results. Considerable controversy has arisen as to whether the animals failed to develop a second infection because of a definite immunity, or by virtue of the fact that they still harbor the infection, as Neisser and also Kolle contend. The crux of the matter is, whether or not it is possible to eliminate syphilitic infection in the rabbit by treatment. Proof of that rests solely upon negative results of inoculation of various organs, notably lymph-nodes, into other animals. It must be borne in mind that it is impossible to emulsify an entire rabbit in order to inoculate all of it into other rabbits.

Re-inoculation with heterologous strains more than ninety days after the first inoculation is successful in over 44 per cent.

In man, so far as is known, acquired immunity against a second infection seems to apply to all strains and there is some evidence from the studies of Jahnel and Lange that syphilis in man protects even against yaws.

There is no convincing evidence that there exists strains of Spirochaeta pallida having a propensity for attacking different organs of the rabbit. This applies more forcefully to man.

Immunologic studies in rabbits have a distinct clinical bearing in relation to re-infection in man, that is, a new infection in a patient, presumably cured of a previous infection. The cases of re-infection

have become much more numerous since the use of the arsenicals, and especially in persons receiving intense treatment in the early period of infection. These studies suggest that re-infection in man is no criterion of cure. It is impossible to establish a frank limit between superinfection and re-infection, that is, where the one ends and the other begins.

Truffi, correlating his studies of experimental syphilis in rabbits to its clinical application, states that, while there are no absolute proofs as to when a syphilitic may be regarded as cured, it may be held, from a practical point of view, that syphilis in man is curable.

An interesting phase in the study of immunity in experimental syphilis is the occurrence of symptomless infection. Schlossberger and Kolle showed that in mice inoculated with Spirochaeta pallida or with Spirochaeta pertunius, the virus spreads through the tissues without provoking any reaction. In these animals, although the blood always failed to infect rabbits, inoculation with lymph-nodes and spleen always succeeded. Likewise in rabbits, symptomless infection has been observed. Kolle was able to produce such infection in male rabbits through copulation with infected females. It has been pointed out that the same thing may happen in man, and that such symptomless, untreated human carriers may be an important cause of the spread of the infection.

Brown and Pearce, from extensive studies of the course of syphilis in the rabbit, emphasizes the important rôle of local tissue reaction to the infection in preventing or modifying the development of generalized lesions. Early or late interference with local tissue reaction alters the course of the disease. By experimental means, they could increase or decrease the incidence of involvement of certain organs. The eye and the nervous system were afforded less protection by tissue reaction taking place elsewhere. The occurrence or non-occurrence of eye lesions was determined by the prior course of the infection. If an animal has had severe secondary bone and skin lesions, eye lesions in such animal were rare, i.e., the immunity was such as to protect the eye from developing lesions. On the other hand, if there were very few bone or skin lesions, eye lesions were constant. These studies correlate clinical observation relative to the incidence of neurosyphilis appearing after insufficient treatment in the early stage of syphilis, and supports Fournier's dictum that neuro-

syphilis was infrequent in patients having a diffuse and well pronounced secondary eruption. These studies also correlate certain phases of interstitial keratitis as seen clinically.

Chesney summarizes the status of acquired immunity in syphilis as a state of resistance which evolves slowly, not always complete, general in its distribution, but imparted to some tissues more than to others, more histogenic in origin rather than humoral; but not as yet known to be the exclusive property of any particular cell; not necessarily dependent upon what is called allergy; not possible to produce by active or passive immunization; not necessarily dependent upon the persistence of infection for its maintenance; finally a state, the mechanism of which is imperfectly understood.

Consistent with increasing knowledge of the rôle that lipoids play in immunity, it seems from available evidence that the biochemistry of the defensive mechanism in syphilis concerns lipoids.

Schumacher and Bergel studied the chemistry of Spirochaeta pallida and conclude that the organism is composed largely of a Gram-negative lipoproteid. The original theory that the Wassermann reaction is the expression of an antigen-antibody reaction in the serologic sense has been given recent support through the investigations of Sachs, Klopstock and Weil and others. These workers obtained positive Wassermann reactions in the serum of rabbits after injecting them with mixtures of alcoholic extracts of heterologous and homologous organs and hog serum. The results of these studies suggest that there is concerned in the mechanism of the Wassermann reaction an antibody for lipoid, whether lipoidal of Spirochaeta pallida or of tissue is controversial.

Bergel emphasizes the rôle of lipoid substances as a source of antibody formation in syphilis. He believes an important defensive reaction in syphilis is the lipolytic enzymes of lymphocytes acting on the lipoidal Spirochaeta pallida. Bergel modified the course of syphilis in rabbits by preliminary treatment with lecithin, which he attributed to the formation of non-specific antibodies.

The idea of a life-cycle of Spirochaeta pallida is being revived. Spirochaeta pallida cannot be demonstrated microscopically in infected lymph-nodes. Levaditi grafted such nodes in the scrotum of rabbits and examined grafts of these nodes at intervals. He observed various forms with a great affinity for the silver stain. These

he considered to be possibly stages in the life-cycle of spirochaeta pallida.

Warthin describes granular silver-staining forms in frequent association with perfectly preserved spirochetes in the lesions of latent syphilis. He believes that the different stages of the forms observed represent changes in the spirochetes.

Kolle demonstrated that rabbits injected with bismuth compound and then inoculated with Spirochaeta pallida fail to develop a chancre although the organism is found in the lymph-nodes. When the bismuth depot was cut out, a chancre developed. He concludes that bismuth only suppresses the development of a chancre without preventing infection. Levaditi, Fournier and others, however, have shown that it is possible to eradicate the infection with bismuth and that Kolle's contention must be considered in relation to absorption of bismuth, which concerns the use of a soluble or insoluble preparation.

Levaditi and others have tested in vivo the spirocheticidal action of forty-five metals. Of these, eight were found to be active, namely, arsenic, gold, mercury, bismuth, vanadium, ruthenium, platinum and tellurium. Tellurium is actively spirocheticidal. Clinically, however, its use is limited by reason of the fact that it forms methyltellurium, which is excreted by the lungs and imparts a strong garlic odor to the breath. Furthermore, it bleaches the hair and pigments the skin. Vanadium is too toxic, and gold too feebly spirocheticidal to be of practical use.

Comparing toxicity and therapeutic effect in syphilitic rabbits, the arsenicals and bismuth preparations are the most superior spirocheticidal drugs.

Levaditi and his co-workers conclude from studies that bismuth exerts a spirocheticidal action after conversion to a proteo-metallic compound (bismoxyl). They believe the liver is particularly concerned in this conversion; indeed, mixing liver with bismuth before injecting it greatly enhanced spirocheticidal action. The therapeutic action of bismuth is proportional to the quantity of activated bismuth in the body. This quantity is indicated by the tissue content of bismuth-tissue metallic potential. Preparations which they regard as ideal are fat-soluble ones. Assuming that their findings are applicable to the treatment of syphilis in man, then their studies show that

the choice of compound in the bismuth therapy of syphilis is a matter
of considerable importance.

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Medical Ethics

A COMMENCEMENT ADDRESS TO GRADUATES IN MEDICINE

DELIVERED AT THE COLLEGE OF MEDICINE IN PHILADELPHIA, 1773

THERE recently came into the hands of Professor James J. Walsh, through the kindness of Dr. Ignac Neumann of New York, a copy of a Commencement address delivered at the College of Medicine in Philadelphia in May, 1773, by one of the. professors in that institution whose name is unknown. Apparently the address was taken down by one of the students and so has been preserved for us. In spite of the 160-year interval which has elapsed since its delivery, this "Charge to the Graduates" contains most of what is valuable in a practical .way for a "Commencement addresser" to say to the "Commencers," to use the old terms which they were accustomed to employ on such occasions.

Above all, the very wise old-time professor emphasized the difficulty of prognosis and how easy it is to bring medicine into disrepute by a pretense to knowledge which is not justified by actual information, and in connection with that how important it is to maintain the patient's hope in spite of the most serious symptoms that might seem to indicate an unfavorable prognosis. We doubt whether anyone in our time can put more effectively the warnings that young men should have before them with regard to the pitfalls in the practice of medicine than did this professor of the olden time whose name, unfortunately, has not come down to us.

He insists on observation as the principal part of medicine and the avoidance of theory. He dwells on the necessity for professional conduct toward colleagues and ends on the optimistic note that in this new country a great many new discoveries will be made that will greatly enhance the efficiency of medical practice for the benefit of patients.

It has seemed worth while to present this old Commencement address at this time for in many parts of the country those who are to make addresses at medical Commencements are looking for something

new to say to the young men that may represent a definite message not to be forgotten. Here is what is oldest in medicine, for almost needless to say Hippocrates emphasized that there is nothing more difficult than prognosis in medical practice. Back there in the third quarter of the eighteenth century men were looking at our problems much more squarely than most of us would think possible and were able to draw hints from their knowledge that would be valuable not only for the graduates of their day but for the graduates of any time, no matter how far distant it might be.   J. J. W.

A CHARGE DELIVERED TO THE GRADUATES IN MEDICINE, AT A COM-
MENCEMENT HELD AT THE COLLEGE OF PHILADELPHIA, IN MAY,
1773. BY ONE OF THE PROFESSORS OF MEDICINE IN
SAID COLLEGE.

Gentlemen: It is more in compliance with the laudable custom instituted in this college, and with your particular request, than to gratify my own inclinations, that I rise up to deliver you this Charge; and although I have little to say to you, but what you have often heard during the course of your education, yet the single circumstance of its being the *last* time you will appear in the character of pupils before us, may give a weight to a few broken hints, which the most formal precepts never had before.

I shall confine myself chiefly to your conduct towards your patients. And of the many duties which you will owe to them. I shall select only two, which have been but little attended to and from which many advantages will be derived to your patients, and much reputation to yourselves.

The first is, to be very cautious in prognosticating the event [issue] of disorders. The practice of foretelling life and death in diseases, took its rise in those ages when the offices of priest and physician were united together. There is, I grant, a possibility of foretelling the issue of chronic diseases, but the exact limits between life and death in acute diseases have never been fixed. Perhaps the credit of physic has suffered more by pretensions to knowledge in these matters, than by all the charges which have been brought against it. It becomes you, therefore, as you love and honour your profession, to endeavour to rescue it from that just contempt to which · this affectation of the gift of prophecy has exposed it. For the same

reason let me advise you, in the second place, never to *give a patient over.* "To pronounce diseases incurable (says the late excellent Doctor Gregory) is to establish ignorance and inattention by law, and to secure ignorance from reproach. There are indeed so few diseases that can be pronounced in their own nature desperate, that we should annex no other idea to the word, but that of a disease which we do not know how to cure." You must therefore dispute every inch of ground with death, nor suffer yourselves to be moved with the entreaties of the friends of your patients, who are too apt to give over applying medicines in extreme cases, from the fear of tormenting them. This arises from a false apprehension of the state of the body in its dissolution. We find death compared by the ancient poets and philosophers, and even by the inspired writers, to a sleep: So gentle and imperceptible are its approaches. And if we may judge from the appearances and even acknowledgements of some people in their last moments, I believe that many men have endured more pain from a violent fit of the gout or toothache, than others have endured from what are commonly called the pangs of death. *"Nunquam desperandum est,"* should be the motto of every physician.

I need take no pains to convince you that physic is a science, and furnished with principles that have been long since reduced to a system. As a religion of some kind has been found necessary in all countries to preserve good morals; so systems of some kind are absolutely necessary to preserve a regular mode of practice in physic. The most zealous advocates for empericism are obliged to acknowledge this, with all their prejudices against them. It has been your peculiar happiness in this college, to hear parts of more than one system, without being forced by the authority of names or the rigour of laws to assent to any of them. Let it be your business hereafter to compare what you have heard with your own observations, and then to judge for yourselves. Only let me caution you against a servile attachment to any one system. This will create a bigotry in physic which will check a spirit of enquiry, and instead of accommodating theory to facts, will lead you to accommodate facts to theory.

Give me leave further to recommend a gentlemanly behaviour towards your brethren of the profession. In a competition of interests and reputations, it is difficult to preserve a just temper of mind. But

a true sense of the weakness of human reason—of the difficulty of observation—of the uncertainty of theory—of the want of precision in our terms—and of the brevity of human life, will raise you above blaming, much more censuring the supposed mistakes of your brother practitioners. Don't esteem a man less than yourselves, because his opportunities of improvement have been inferior to your own. Much mischief has been done in physic under the sanction of a diploma. A man may be a regular physician who never attended a lecture on any branch of medicine, but derived all his knowledge from nature and experience. Above all deal gently with the prejudices of age; and should you live to be old, treat with the same gentleness the ignorance and petulance of youth. Remember these are the natural infirmities of those two stages of life. In a word, in all your conduct do to them what you would wish in like circumstances they should do to you. I shall conclude by reminding you that you have not yet finished your studies. You have only acquired a foundation here, on which to build must be the business of your future lives. You cannot want motives of the most interesting nature to prompt you to study in this new country. While the physicians of the other parts of the world rely chiefly for reputation upon the novelty or ingenuity of systems drawn up in their closets, you have here an ample field for enquiry opened before you. The epidemic and endemic diseases, the climates and soils, the plants, animals and fossils which are peculiar to America, remain yet to transmit some favourite names with honour to posterity. Perhaps discoveries may be made in this country, which may remove those complaints of imperfection which prevail in every branch of philosophy; for the mighty fabric of science may be compared to a well-built arch, which rests not upon a part, but upon the whole of the materials which compose it.

We cannot take our leave of you without expressing the uneasiness we feel upon being parted. The pleasure of receiving and communicating instruction we believe was reciprocal with us. May the blessings of hundreds and thousands ready to perish come upon you, and may you always enjoy every possible form of happiness and prosperity.

Maxima prodentia in arte medicandi.

Hygiene

GRAPHIC COMPARISON OF THE MORTALITY RATES FOR PHILADELPHIA DURING THE YEARS 1900 AND 1930

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The colored chart (Frontispiece) is intended to show as closely as may be the respective percentages of the total number of deaths in Philadelphia at the end of the last century (1900) and in 1930 that were due to various causes or groups of causes, but it also brings out certain trends that show why and wherein the efforts of preventive medicine and of public health work in general must be changed from time to time. The data from which the computations are made are official, those for 1900 being from the Mortality Statistics Report of the U. S. Census Bureau, and those for 1930 from the Registration Bureau of the Philadelphia Department of Public Health.

Objection may be offered that the statistics for any given year may not accurately indicate the average of the general period in which the year occurs. This is well known with regard to the incidence of certain diseases, such as the exanthemata and especially measles with its tendency to periodic and somewhat rhythmic extremes. But the accumulated data do not show such variance in the annual mortality from tuberculosis, cancer or the systemic causes, and the writer believes that the statistics of the two years in question are sufficiently characteristic of their respective periods for the purpose of this comparison. Thus, it will be noted that the mortality from measles has not been considered separately but grouped with that from scarlet fever and whooping cough, the variance in the yearly incidence of each tending to counterbalance that of the others; while a study of the records will show that the mortality in 1900 due to typhoid fever and diphtheria was not greatly different from the average for those diseases for the preceding decade. At any rate, the differences between the respective mortalities for the years in question are marked enough to indicate the decided change both in con-

ditions and in the direction in which future efforts in preventive medicine must be exerted.

Today it is difficult to realize that in 1900 almost one-fourth of all the deaths in the city were due to tuberculosis and even more than one-fourth to typhoid fever, enteritis, diphtheria, scarlet fever, measles and whooping cough, collectively, while last year all of these maladies, including tuberculosis, could claim only one in twelve of those who died. In fact, when we see that typhoid fever, diphtheria, scarlet fever, measles and whooping cough together were responsible for less than *two-thirds of 1 per cent.* of the total mortality, that tuberculosis is no longer the "captain of the men of death," and that in all probability there will never again be any marked increase in the deaths from any one of these, we can appreciate the great victory that has been achieved in the combat against these former deadly enemies.

On the other hand, while the mortality from pneumonia is still unchanged and indicates the need for special effort to diminish it, it is evident that there is a marked increase in the percentage of deaths from cancer, nephritis and diseases of the heart and circulatory system. This is realized and well appreciated by the profession today, but that the chart helps to demonstrate that part, at least, of this increase is apparent rather than real, for there was a very considerable percentage of the deaths in 1900 listed as due to "unknown or unspecified causes" of which the greater proportion, in all probability, were due to the causes that seem to have increased so markedly since then. The fact that this group due to "unknown causes" has dwindled to almost nothing in 1930 should be good evidence in this respect.

There are two other groups that show an appreciable increase in the thirty years and that should receive special and careful attention henceforth, not only because of their fundamental importance in public health and civic welfare but because their continuing increase will imply a failure to make full use of modern knowledge and preventive methods. These are the diseases of the nervous system and those incident to child bearing and early infancy.

Lastly, it is interesting to note that, although there was an increase in the city's population of approximately 50 per cent. in the three decades, there were actually fewer deaths in the last year than in the first. In other words, proportionally only three died in 1930 where five of the population died in 1900.

Surgery

PAPILLARY CARCINOMA OF THE BLADDER

GOOD AFTERNOON, GENTLEMEN!—The first patient we have to present to you this afternoon has had a clinical diagnosis of papillary carcinoma of the bladder. This immediately brings up the question of biopsy in these cases. Should we obtain a biopsy specimen with a Rongeur cystoscope before deciding as to the particular type of treatment?

A few weeks ago Doctor Ewing visited us in Detroit and gave three very interesting and instructive lectures on cancer. He believes that in papillary carcinoma of the bladder, a biopsy specimen is misleading as it is very often taken from the projecting part of the tumor, rather than from the base where malignant changes would be found. Personally, I agree with Barringer, who says that "if only the projecting part of the tumor is removed for pathologic examination, the clinical estimate of a tumor's malignancy should receive more weight than the pathologic."

Cystoscopic examination tells us the location, the size, and whether the tumor is sessile or pedunculated. Tumors located in the base are more often highly malignant than those in the dome or lateral walls. The distance from the ureter is of importance in considering possible ureteral involvement. The size and number of growths may determine the mode of attack. I think that every cystoscopist feels that pedunculated tumors give the best prognosis, but Broders warns us that a neoplasm may be of papillary form and possess low or high malignancy. We must not forget that sometimes these growths are secondary to a kidney involvement and rule this

out each time. While we all agree that all bladder tumors are potentially malignant, we are not agreed as to the method of treatment.

A résumé of this patient's history is as follows: R. M., male, aged fifty-three, entered the Out-Patient Department April 1, 1931, complaining of painless hematuria for two years, bleeding of one to four days' duration, every two or three months. The last two attacks were associated with lumbosacral pain. His last attack was four weeks ago.

Past history.—G. C., at the age of thirty, at which time patient thinks he had a stricture. Difficulty in starting stream and nocturia ever since. Was cystoscoped April 8, 1931. A mass was found two and one-half centimeters in diameter, lateral to left ureteral orifice. Gross diagnosis, papillary carcinoma. Bladder specimen, ten to twenty red blood-cells. Bladder culture, streptococcus and staphylococcus. Ureters were catheterized and specimen and cultures obtained. Kidney urines were negative. Cultures negative. Left pyelogram was normal. On April 16, 1931, the patient was hospitalized.

General Physical Examination.—Prostate and vesicles normal. Hemoglobin, 85 per cent.; red blood-cells, 5,000,000; white blood-cells, 10,200; polymorphonuclears, 79; leukocytes, 29. Urine loaded with red blood-cells. Blood Wassermann, negative. Blood chemistry, N. P. N. 30, sugar 95. K. U. B. flat plate was negative. X-ray for metastasis was negative.

Treatment of Bladder Tumors.—The treatment of bladder tumors is in a state of flux. We all, I think, use fulguration for the so-called benign papillomata. If, from a practical standpoint, we divide bladder tumors into three groups, papilloma, papillary carcinoma, and infiltrating carcinoma, then the type of treatment, whether it be surgery, diathermy, radium, X-ray therapy, or a combination of these, must depend upon the individual case and equipment and experience of the surgeon. The question of immediate mortality must be balanced with the end-result. The solution of the treatment of cancer of the bladder, as far as radium is concerned, will be as in the treatment of all cancers, in hospitals especially equipped for this purpose.

From a practical standpoint, we should keep certain facts in

mind in performing a suprapubic radium implantation. They are as follows:

(1) Spinal anesthesia is the anesthetic of choice.

(2) The bladder should not be mobilized and the wound should be carefully protected with gauze.

(3) The growth is removed by cautery and radium is implanted if the base is infiltrated.

(4) The radium dose should be large as many failures are due to an insufficient dose.

TUBERCULOSIS OF THE KIDNEY (DOUBLE PELVIS AND URETERS)

We are showing this case because congenital anomalies are always of interest and certain errors of diagnosis may take place. This is one of the most frequent anomalies of the urogenital system. The ureters may be entirely separated or joined. This patient has a double pelvis and two ureters on the left side, and a single pelvis and ureter on the right side. It has been stated that the two pelves are always situated one above the other. Recently Bumpus reported a case where one pelvis was anterior and the other posterior. Braasch states that the function of the two segments about equals that of the opposite side. The ureters most frequently join in the upper third and when they are separate usually cross near the bladder. The ureteral opening draining the upper pelvis invariably lies to the outside, or, in other words, the ureter from the inferior segment crosses in front of that from the superior and implants itself at a higher level. The first slide shows the ureter crossing twice. (Slide demonstrated.)

Embryology.—The ureter first makes its appearance as a budding from the ampullary end of the Wolffian duct close to its point of opening into the cloaca. This bud pushes up toward the nephrogenic cells. The end of this bud dilates and forms the renal pelvis. The blind end of the ureter sometimes splits prematurely, the result being a bifid pelvis. If the split occurs near the Wolffian duct, a partial or complete double ureter results. The only difference between a diverticulum of the ureter, bifid pelvis, fused ureter and a double ureter is one of degree. I will now show you a slide demonstrating a diverticulum of the ureter. (Fig. 1.)

Fig. 1.
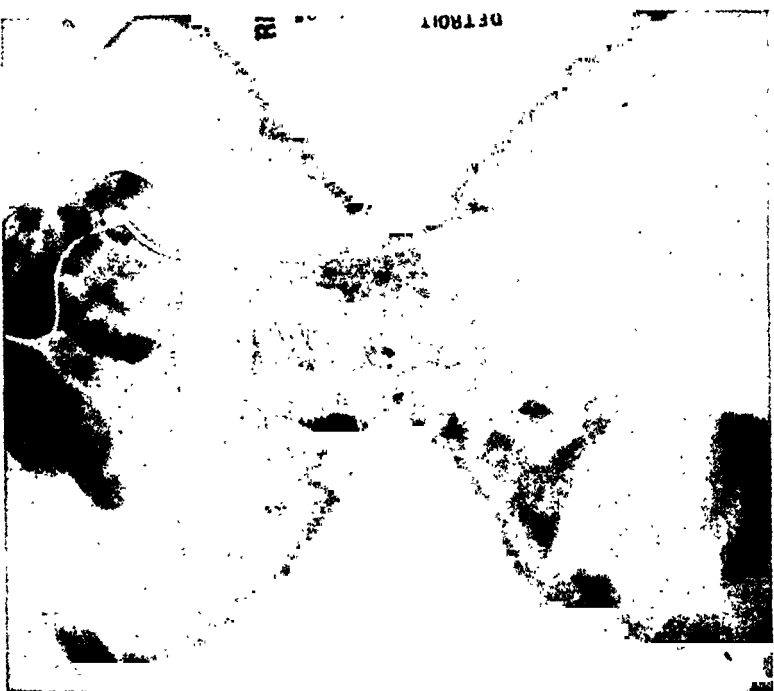
Diverticulum and twisting of ureter, with a pyelogram. Residual solution is shown in diverticulum.

Fig. 2.
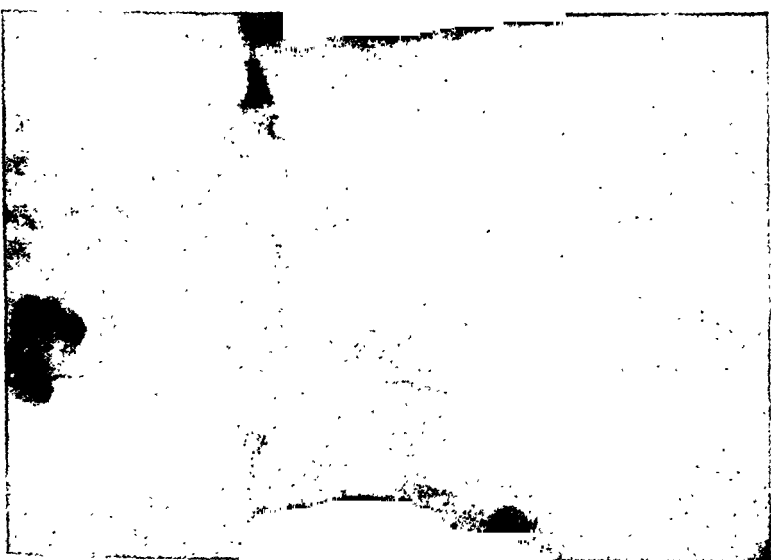
Pyelogram of the upper pelvis of the kidney.

Fig. 3.
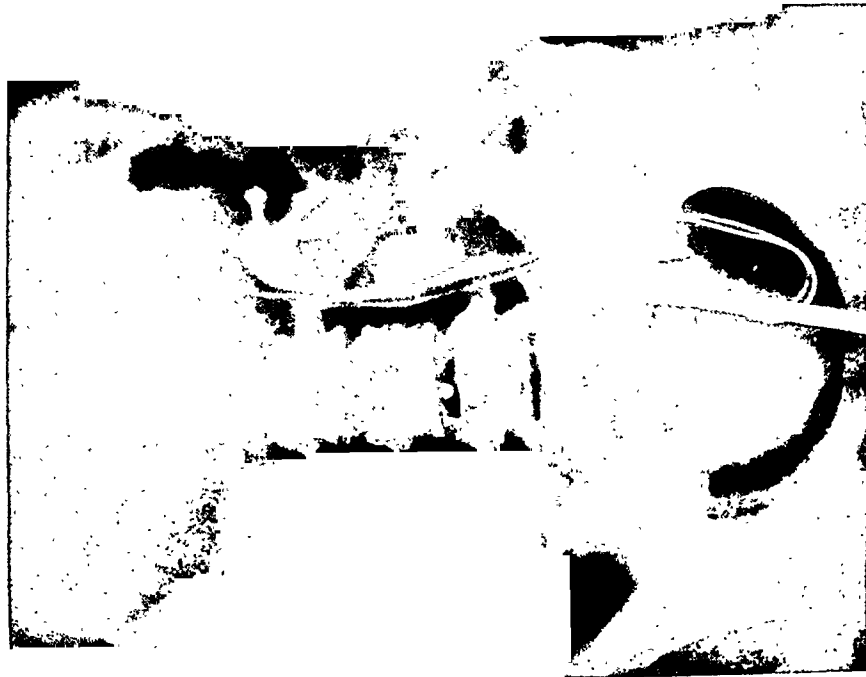
Fig. 4.

Pyelogram of double pelvis of the kidney, with double ureters end-
ing in two ureteral openings in the urinary bladder.

Pyelogram of opposite kidney, with ureter.

History.—H. H., female, aged twenty-four, entered the Out-Patient Department February 26, 1931, complaining of pain in the left costovertebral angle. Six years ago, during pregnancy, patient complained of chills, fever, nausea, vomiting, frequency, and burning on urination. A therapeutic abortion was done at six months. Had no symptoms for four years. Recurrence of the same symptoms at six months' pregnancy, and was again aborted at seven months. Was free of all symptoms until two days before entrance to the Out-Patient Department, at which time she had pain in the left lumbar region, malaise, and chilliness. The left kidney was palpated at this time. There was left costovertebral tenderness, otherwise negative. Temperature, 100.4°. Urinalysis, 40. White blood-cells with clumping found. H. B. 75 per cent.; red blood-cells, 4,330,000; white blood-cells, 13,400; polymorphonuclears, 68; lymphocytes, 30; mononuclears, 2; N. P. N. 35.3. Blood Wassermann, negative. B. M. R. minus 3 per cent. The gynecologic department reported the patient not pregnant. March 16, 1931, K. U. B. negative. April 2, 1931, patient was cystoscoped on the outside. Cystoscopy showed diffuse inflammation of the bladder, cystitis cystica, grade I, over right and left base and trigone; right orifice normal, left orifice gaping. Ureters were catheterized and specimen obtained. Indigo-carmin five and one-half minutes on the right, six and one-half on the left, good concentration. Occasional red blood-cells, occasional pus cells on the right. One or two pus cells and red blood-cells on the left. Acid-fast bacillus positive on left side and left pyelogram was made. (Fig. 2.) A diagnosis of left renal tuberculosis was made and patient was sent in for nephrectomy.

Patient was hospitalized April 9, 1931, complaining of frequency of urination, dysuria, during the six weeks' period of Out Patient Department observation. There was left costovertebral tenderness.

Cystoscopy.—Fourth, 16, 1931, from the "bow tie" pelvis found on previous cystoscopy, a double pelvis was suspected and patient was again cystoscoped, at which time two ureteral openings were found. These were catheterized and pyelogram made. (Fig. 3.) One ureteral opening was found on the right side. A pyelogram was made. (Fig. 4.) No tubercle bacilli were found at this time from either the right or left kidney. Guinea pigs were inoculated.

Pyelogram Report.—The roentgenologist was of the opinion

that the "bow tie" pelvis, as shown in the first pyelogram, was not suggestive of tuberculosis. He reported a double pelvis and double ureters on the left side, single pelvis and ureter on the right side, with some rotation of the right kidney.

Acid-fast organisms were found in the urine from the upper pelvis. It can be easily seen how the organisms we found in one pelvis might have been overlooked if the wrong ureter had been catheterized.

Young advises against resection of the kidney in tuberculosis but it is possible to conjecture that if the infection were confined to one pelvis and the two segments were held together by a thin band of renal parenchyma or by connective tissue only, it would be feasible to perform a heminephrectomy. I now have a patient in good health, without any urinary symptoms, on whom I performed a hemi-nephrectomy fifteen years ago.

This patient will be kept under observation and a further search made for tubercle bacilli. If such is found a left nephrectomy or heminephrectomy will be performed.

CLINIC CONDUCTED BY DR. L. J. HIRSCHMAN AT HARPER HOSPITAL, DETROIT, FOR THE MEMBERS OF THE CLINICAL AND SURGICAL ASSOCIATION OF MASSACHUSETTS, MONDAY, APRIL 20, 1931

HEMORRHOIDECTOMY

IT CERTAINLY is a great pleasure to have you gentlemen of the East return some of the many visits which we have made to the Atlantic seaboard.

I am working in a lowly field and limit my endeavors to the diagnosis and treatment of diseases of the large bowel. This morning, however, I am purposely eliminating surgery of the colon and will limit myself to the surgical treatment of affections of the terminal end of the large bowel. I am going to present for your consideration our technic for the operative treatment of internal and external hemorrhoids, pruritus ani and fistula-in-ano.

I will first illustrate by means of lantern slides the various steps of the technic which we have found most satisfactory. You can then follow more intelligently the steps of the operation. I will operate upon four cases of hemorrhoids, one of which is also affected with pruritus ani. After this I will present an incomplete fistula-in-ano.

Before starting the operations I would like to say a word about the preparation of the patient and also very briefly discuss my choice of anesthesia.

The typical hemorrhoid patient is admitted to the hospital the day before the operation. He is put upon a fluid and high-caloric diet. He is not given a cathartic. The patient is given a sedative before his first night in the hospital so that he may have a restful night and not be unduly disturbed about the operation of the morrow. Any one of the barbital group will answer very well. A warm enema of 1 per cent. soda-bicarbonate solution is given the night before the operation and the first thing in the morning as well. Female patients receive also a boric-acid douche with each enema. Two hours before the time designated for the operation, 20 grains of chloretone are administered, and in addition to this, if the patient is one who has suffered much pain or is of the emotional type, a hypo-

dermic injection of morphine from 1/8 to 1/4 grain with from 1/200 to 1/150 hyocine is added one hour before the operative hour.

The patient is placed on the operating table in the left lateral position. It really makes no difference which position is used as long as it is one which is comfortable both for the surgeon and the patient. I prefer the left lateral position because in this position the abdominal viscera fall away from the rectum and there is no pressure on the hemorrhoidal plexus, which there would be if the patient is put in the lithotomy position. The sigmoid flexure being located on the left side naturally falls away if the patient lies on this side. The left lateral position gives a splendid view, as you can see, of the entire perineum and is to be preferred to the lithotomy position because in the latter, the stirrups, leg holders or other supports do not keep the knees and legs out of the way either of the surgeon or his assistants.

The parts are not shaved. If there is excessive hair, it is clipped. This is always done in case of plastic operations.. The reason we do not shave the parts is because of the fact that after shaving one is troubled in this region with many ingrown hairs, which become infected. They cause pruritus and the patient in scratching infects the surface with his finger-nails. The patient has had his bath and soap-and-water scrub before leaving his bed for the operating room, so no further water is used. The parts are sponged with alcohol and then painted with a 4 per cent. solution of mercurochrome. We like mercurochrome better than iodine because it does not irritate exposed surfaces. For that reason also we keep alcohol away from eroded or exposed surfaces. The patient is allowed to have a pillow and is made as comfortable as possible. The right knee is flexed to its extreme and placed on a pad. The left leg is extended so that it parallels the left side of the operating table.

As far as anesthesia is concerned, it has been a long time since I have used any type of sleeping anesthesia for rectal or colonic surgery. For a simple case of fissure, single thrombotic hemorrhoids, small internal hemorrhoids, and an excess of hypertrophied anal papillae, infiltration as shown in the slides, with 1/2 per cent. solution of novocaine in Ringer's solution or nupercain is employed. In the cases which I am presenting to you this morning, caudal anesthesia will be employed. I use a 2 per cent. solution of novo-

caine in Ringer's solution and use anywhere from 25 to 40 cubic centimeters depending on the size and weight of the patient. I prefer the single injection into the caudal canal to the multiple injections required for the transacral or parasacral method of injection. In the latter method, nine punctures are necessitated while the single puncture used in caudal anesthesia is all that is necessary. You will notice that I locate the point of puncture by pressing with my index finger over the triangle formed between the two sacral cornua. This feels the same as pressure on a knuckle. The sacral hiatus will be found about two to three inches above the tip of the coccyx in the average individual. I take the syringe filled with 2 per cent. solution and armed with a 2-1/2-inch 20-gauge flexible needle, plunge it quickly through the skin for about one-fourth inch. You will notice that I pierce the skin at a right angle to it rather than using an oblique angle, the right angle being the shortest distance through the skin and causing less pain than the slanting puncture. I immediately start to inject the solution so that the progress of the needle will be painless. We soon note a slight resistance, comparable to the drum membrane. Piercing this we have the sensation of entering a hollow cavity. This is the sacral canal. Drawing back on the plunger of the syringe so as to create suction will at once warn us if we have punctured a vein as blood will immediately appear. If this happens the position of the needle must be changed. I firmly believe that there are very few cases of real novocaine poisoning from caudal injection. One can see, however, how the symptoms of syncope, pallor, rapid pulse, and depression, which have been noted in some individuals from the injection of novocaine solution, can be caused by the unconscious, unwitting, and unpremeditated intravenous injection of novocaine by the puncture of a vein in the sacral canal. I believe this is also true in infiltration anesthesia, when novocaine solution is forced into a vein without the operator's knowledge. We are injecting sufficient of this solution into the patient to get complete relaxation of the sphincter, levators, and, in fact, the whole rectum and perineum up to the level of the sigmoid. This will be complete in the average case in from seven and one-half to fifteen minutes. Anesthesia of the musculature precedes the surrounding skin by several minutes. You will notice in this patient the beautiful relaxation we are getting. You will notice that we do not dilate ': sphir----

with our fingers and we never use a bivale speculum. We believe that if one does not secure sufficient relaxation by anesthesia alone, nothing more can be gained by forceful divulsion, which means tearing of the sphincter fibers. You will notice in this patient sufficient relaxation so that a silver dollar could be passed into the anal canal with ease.

I do not use a bivalve speculum for any anal or rectal operation because the blades of the speculum conceal more of the cavity than they expose. You will notice that by placing these four Pennington forceps at the four points of the compass on the skin just outside of the anal verge and traction being exerted that the anal canal is practically everted. This converts what was formerly a difficult internal operation into a simple external one. Recalling what I have just shown you on the slides, you will notice that I grasp each of the three main hemorrhoidal masses in turn with my hemorrhoidal forcep just below its juncture with normal mucous membrane. With my ligature carrier threaded with No. 2 chromic catgut, I encircle the blood supply of each hemorrhoid just before it enters the hemorrhoid. Each of these three hemorrhoidal masses is made practically bloodless by the secure ligaturing at this point. An ellipse of mucous membrane is then dissected from each hemorrhoidal mass starting with the left lateral which is the most dependent and the varicose veins which compose the hemorrhoids are exposed. These are removed down to the sphincter in each case. Any spurting vessels are tied. We rarely have to do this because the preliminary ligature takes care of the main blood supply. The wounds are left open as we do not believe that rectal wounds should ever be closed. If one closes a rectal wound by suturing it is inviting disaster because one cannot procure a sterile field in this part of the body and infective material is bound to be enclosed in the wound. Any redundancy or hypertrophy of the skin folds will be found corresponding to the location of the three main internal hemorrhoidal masses. These are excised by radial incisions. It is important that no lipping or cupping of the skin surfaces should be allowed to occur. The outer extremities of each wound must be brought to a point and every incision brought outside of the anal orifice to the skin for drainage. We do not employ any sort of clamp operation and never use a cautery. We do not use a clamp because this infers a blind operation. We must have our

anal wounds open and we must see the sphincter in every case so that we know all varicose veins are removed. An internal hemorrhoid is a tumor covered by mucous membrane, composed of diseased veins and connective tissue. With practically all the hemorrhoidal clamps which are used, mostly mucous membrane is grasped and it is practically impossible to remove all the varicose membrane in the grasp of this forcep. This means that too much of the valuable mucous membrane is sacrificed, and not enough of the real pathology, the varicose veins, removed. One certainly would not employ clamp and cautery technic in the removal of a varicose tumor of the arm or leg but would make a real surgical incision, excise the pathology and not remove a great big mass of skin without observing what was underneath the same and then sear the edges with a cautery. A burned wound always heals with much more contraction and deformity than an incised wound and this is especially undesirable in a circular cavity lined with mucous membrane.

You will notice that at the conclusion of this operation we do not insert tubes, gauze, tampons, or packs. The insertion of a tube is usually an indication of the uncertainty of the operator as to his hemostasis, but it is supposed to also be a vent for gas. A rubber tube, like gauze, acts like a foreign body and invites peristalsis much sooner than either patient or surgeon desires. If gauze, tampons or packs are placed in the rectum for the purpose of keeping the muscles "in extension," this is a confession on the part of the surgeon that he has not secured sufficient relaxation of the muscles. A strip of rubber tissue which has been lubricated is all that is necessary in the anal canal to prevent agglutination of raw surfaces. If the patient should have any bleeding or desire to pass gas, either blood or gas will escape alongside of the rubber strip and the patient is unconscious of anything foreign having been placed in the rectum at the time of operation. Therefore, you will not see any tubes, tampons, or packs used in this series of cases. Three rolls of gauze placed against the perineum so as to make a wedge or pyramid between the buttocks will provide sufficient pressure against the skin surface to control any oozing that may be present and add to the patient's comfort. These are secured in place by a wide T-bandage.

You will notice that the technic used in these three cases is practically the same, the only difference being the amount of tissue re-

moved according to the size of the hemorrhoids. You will notice that all of these patients are completely at ease and the parts wonderfully relaxed.

This third case, in addition to the hemorrhoids, has pruritus ani. Therefore, in addition to the hemorrhoidectomy you will notice that we make an incision in the perineum from the anal verge almost to the vulva and another incision in the posterior commissure two and one-half inches in length, extending toward the coccyx. With a Bard-Parker blade we carefully dissect all of the skin away from the underlying structures through these two incisions. You will notice that I do not make an incision paralleling the lateral anal edges because incisions in this line would cut across too many nutrient vessels and it is not desirable to interfere with the blood supply of the flaps. This was one of the faults of the old Ball operation which was followed by so many sloughing areas of the peri-anal skin. Now that I have thoroughly tunneled the peri-anal skin, I place a strip of rubber on either side of the anal canal and tie them with catgut to prevent reuniting of any of the divided nerve endings. These are removed in forty-eight hours.

In the treatment of pruritus ani, it makes no difference what the etiology may be, when the patient presents himself with a hypertrophic and proliferating dermatitis, which is being constantly made worse by the secondary infection produced by the patient's scratching with his finger-nails, one has to stop the itching at all cost. Fortunately, this circumanal neurotomy will do this. The patient is instructed not to use toilet paper in cleansing himself but to use absorbent cotton or similar preparations for the purpose.

This patient will be up and allowed out of bed within twenty-four hours to use the toilet or to take hot sitz baths. They will all have soda enemas after forty-eight hours after having had mineral oil the previous night. The sooner we can secure the coöperation of the patients in getting out of bed and being on their feet, the much sooner they heal. Hospitalization is lessened and convalescence greatly enhanced.

The last case which I present is a case of incomplete peri-anal fistula. You will notice that he was operated upon some time ago and the old scar remains. Injection of bismuth paste into the ex-

ternal opening discloses the cavity extending back to the tip of the coccyx and around the left posterior quadrant.

I am using 50 milligrams of novocaine by subarachnoid injection in this case. I do not believe in injecting anesthetic solutions close to the fistulous opening on account of the possibility of carrying infection into the subcutaneous tissues. You will notice how quickly relaxation is secured. We now reinject heated bismuth paste into the external opening to fill up the cavity in order that we may palpate this and observe where the paste emerges if there is an internal opening. You will notice that we do not see the bismuth paste coming from the anal crypts, showing that if there was an internal opening it has closed, and we do not use force to open it.

This, therefore, is a peri-anal abscess about the size of a large hen's egg and which does not communicate with the interior of the bowel. It is therefore an incomplete fistula. You will note that we incise all of the diseased tissue and we cut away the skin as far back as the widest portion of the abscess. This is done so that there will be no over-hanging or growing in of the wound as it heals. We do not use gauze packing in this fistula but instead I am placing four pieces of rubber tissue into the wound as drains. Tomorrow, any of you who wish to see this will be interested in finding that what was a deep cavity has become a shallow saucer-shaped wound. A gauze pack, by its irritation, promotes the growth of connective tissue-and causes much more scar formation than if the wound is allowed to collapse immediately.

The postoperative care of a fistula case is similar to that of the hemorrhoid. The patient is allowed to have sitz baths as soon as he wishes to be up and out of bed, he answers the calls of Nature and is given the same sort of postoperative care. We allow our patients to take solid foods inside of three days. We believe that a soft, lubricated but well-formed stool is the best dilator one can use. It is, after all, Nature's dilator and the correct way to dilate the canal is from in outward. We therefore do not use any other form of dilator and find them very rarely necessary in the after-treatment of anal rectal wounds.

"The proof of the pudding is in the eating thereof," and the grateful glance of a comfortable patient on the following day is the best evidence to the surgeon that the simpler the technic and the less fussy the after-care, the better the result.

CLINIC CONDUCTED BY DR. GEORGE KAMPERMAN AT HARPER HOSPITAL, DETROIT, FOR MEMBERS OF THE CLINICAL AND SURGICAL ASSOCIATION OF MASSACHUSETTS, TUESDAY, APRIL 21, 1931

TRICHOMONAS VAGINALIS VAGINITIS

IN THE brief time at our disposal we shall not be able to present and discuss all phases of this interesting condition. We shall be able to present only the high spots and we propose to show how a diagnosis is made and the type of treatment followed in this clinic.

First of all, let me emphasize at the beginning that we feel this condition is very important (1) because of its frequency, (2) because of the distressing symptoms it may produce, and (3) because of the fact that failure to recognize the condition has resulted in the performing of many unnecessary operations.

We shall not discuss the history or literature except to mention that our knowledge of the condition dates back to 1839, when Donné first wrote about it. Following this, most of the literature is concerned with discussing the question whether the trichomonas is pathologic and whether it really causes the vaginitis ascribed to it. This difference of opinion resulted from the fact that the trichomonas was found in women who presented no symptoms. We know now that typhoid bacilli may be found in people who do not have typhoid fever and diphtheria bacilli are found in throats not affected with diphtheria, and likewise we believe the trichomonas can be pathologic and yet can be carried by women in whom no disease appears. The American clinical literature on this subject dates back only a few years.

Under symptomatology, I wish to emphasize five symptoms. The chief symptom is a profuse leukorrhea. This discharge may be very copious and is of a pale yellow color and often a nile-green color. The discharge appears foamy and bubbly. Besides this thin discharge there are often streaks of blood and in older patients may make one suspect a malignancy. Another symptom, resulting from the discharge, is a marked vaginal irritation. This may be extremely distressing and may involve not only the vulva but also the upper

thighs, so that the patient may have distress on walking.   Another symptom resulting from the irritation is dyspareunia.   In fact, in well-established cases coitus becomes absolutely impossible.   Finally, the condition may be a cause of sterility.   We have seen cases where all treatment of sterility failed until the trichomonas was recognized and the clearing up of the condition was then followed by a pregnancy.

We wish to describe the various types of patients that present themselves.   Whenever a patient presents herself and gives a history of having consulted numerous physicians and had various types of treatment without success, it suggests at once to us that perhaps the offending organism is the trichomonas.   And in nearly all cases that is what we find.   The treatment the patient has had has usually been directed against a suspected gonorrhea or an endocervicitis, and has not been effectual in clearing up the trichomonas.

The next type we see is the patient who presents an unusual degree of irritation.   This is all out of proportion to what we usually find in a gonorrheal infection, and in these cases also we find the trichomonas is present.

Another type of patient is the one who consults us for dyspareunia.   Whenever we are consulted by a patient who develops a dyspareunia after perhaps years of normal marital life, we immediately suspect trichomonas infection and in practically all cases the organism can be demonstrated.

When we first became cognizant of this type of vaginitis and became aware of the possibilities, we went over a list of patients that in past years we had treated without success.   Some of these patients were still on our lists and we were able to send for them.   Every one of these showed a trichomonas infection.   We remember particularly one physician's wife whom we had treated and treated without success.   Coitus had been impossible for several years, although previously there had been no difficulty.   A few treatments transformed the picture so much that we have not been able to treat her as persistently as we desired, the patient insisting she was now cured.

We might ask why have we failed to make the diagnosis of trichomonas.   In most cases, the physician makes a smear and examines it for the gonococcus.   This means that a stained smear is examined, and the reason for not discovering the trichomonas is that the or-

ganism is not stained by the routine dyes that are used. The trichomonas must be looked for in a fresh specimen, and to differentiate it from other cells it must be alive so that its motility can be demonstrated.

In presenting these patients we hope to demonstrate the pathology accompanying the disease. The vulva is bathed in this thin discharge and the tissues are much irritated. The upper thighs may be irritated, and present a brown thick induration of the skin. Often the skin is excoriated from scratching. The thickened skin often presents small fissures. The whole introitus is deeply reddened. There is no particular involvement of Skeene's glands, vulvo-vaginal glands, or of Bartholin's glands, but the redness is diffuse and general. When the speculum is inserted into the vagina numerous small petechia are seen on the reddened vaginal wall and on the cervix. This condition is mentioned as "strawberry vagina" and "strawberry cervix." When the speculum is withdrawn, the spoon-shaped blade of the speculum scoops out some of this nile-green foamy discharge. With a small pipette we take a drop of this discharge and place it on a slide and we add to it a few drops of salt solution. After mixing this or stirring it we float a cover glass on this solution and examine it with a high-power objective. We use the oil immersion lens for this. The organism is very translucent and too much light must not be used. In this case numerous organisms can be seen. They sometimes remain motile under the microscope for several hours.

A variety of treatments have been advised. This fact is evidence that the treatment is still not standardized, and is not entirely satisfactory. We believe the principle part of the treatment is a mechanical scrubbing of the vagina with pledgets of cotton and soap. We insert the bi-valve speculum and with a long dressing forcep we hold the pledget of cotton soaked in tincture of green soap and scrub the sides of the vagina vigorously. We rotate the speculum and scrub the anterior and posterior wall. The first treatments are nearly all very distressing. Often the scrubbing results in bleeding from the vaginal mucosa. We have devised a special speculum for treatment of these cases. It consists of the ordinary bi-valve speculum from which most of the blades have been cut away, leaving only the rim. After a thorough scrubbing, the vagina is wiped dry and some type of antiseptic is used. We use a full-strength boro-glyceride solution.

We pour this into the vagina with the speculum in place. Enough is poured in to fill the vagina. We then insert a small tampon into the introitus and carefully remove the speculum, leaving the glycerine solution and tampon in the vagina. The patient removes the tampon the next morning and takes a douche consisting of two quarts of water and one ounce of tincture of green soap. These treatments are given twice a week. The patient is also advised to scrub the vulva and thighs with a good lather every night before retiring. After this nightly scrub she bathes the parts with a 50 per cent. glycerine solution. In some cases we advise the vulva be shaved so that the treatments may be more effective.

This demonstrates one kind of treatment. There are many others. The treatment must be persistent. A few treatments often give great relief, but the complete cure requires perseverance. Recurrences are common, due probably to the fact that the unknown source of the infection has not been cleared up.

Why do we present this subject to a surgical group, and what is its surgical significance? Its surgical importance is mainly a negative one. Many a patient has been subjected to a Sturmdorf operation of the cervix, or perhaps a hysterectomy without relief from the discharge, and if we later on discover that the patient was suffering from a vaginitis due to the trichomonas vaginalis, we will then realize why these operations were without result. For this reason, before we advise surgery for the relief of a vaginal discharge, let us rule out the trichomonas vaginalis.

CAESAREAN SECTION FOR CONTRACTED PELVIS

The term "contracted pelvis" is rather a relative term. In every labor case it is a question of the size of the fetus in relation to that particular pelvis. A given pelvis may offer no unusual resistance to a small baby while it might offer obstruction to a larger baby. For this reason an absolute contraction is rather rare—that is, it is rare to find a pelvis that would offer serious resistance to any fetus regardless of size.

Most cases of contracted pelvis belong to the border-line group. These are pelves of moderate contraction and the possibility of a normal birth will depend a great deal on the size of the fetus. In

such patients it is not possible to predict very positively as to what labor will accomplish.

In most cases of this type obstetricians have learned that labor will end spontaneously if the patient is given an opportunity. This trial labor is spoken of as a "test of labor." We realize that the term "test of labor" is rather a loose term. A real test of labor means a sufficient length of labor which would really accomplish something in most cases.

A great many primipara have long, hard labors and more babies are lost with primipara than with multipara. We believe that in a doubtful pelvis, with a long labor, and with perhaps loss of the baby, it does not always mean that a caesarean section should have been performed. After one hard labor a second labor may often be easy. This fact sometimes makes it difficult to decide how to conduct a second labor. In fact, occasionally it takes the second difficult labor to really prove that a pelvis is too contracted for that baby.

Our patient is representative of that type. Her first labor occurred in 1926, when she was delivered of a stillborn five-and-one-half-pound baby after a very long labor. Cerebral hemorrhage was responsible for the fetal death. Her second delivery occurred in 1927, when she was delivered of a somewhat larger baby and a craniotomy was performed to allow delivery of the baby. In both instances the labor was conducted by an extremely conscientious family physician, with the consultation of an expert obstetrician during the second labor.

Careful examination shows the patient to be of short stature, a mild dwarf type. The bones of the pelvis are heavy, and vaginal examination shows the pelvis to be very narrow laterally. The pelvis measurements are: intercrestal 26, intraspinous 22, intertrochanteric 29, external conjugate 17.5. The sacrum can be palpated with unusual ease. We would classify this pelvis as a flat, generally contracted pelvis. When patient stands it is seen that the abdomen is very pendulous and hangs forward over the pubes. Rectal examination shows the head floating. In fact, it cannot be reached per rectum.

These findings, together with the history of the two previous deliveries with stillborn babies, lead to the conclusion that we have

here a definite disproportion which makes successful vaginal delivery impossible. For this reason we will perform a caesarean section.

Having decided on this fact we feel the most important part of our task is completed. To conscientiously arrive at that decision requires the exercise of a lot of judgment and the performing of the operation is a simple thing compared to making the proper decision.

We propose here to perform a conservative caesarean section. We do not wish to interfere with her ability to have other children. After having several children we might not insist on this point so strongly. But we know she is eager to have more than one living child.

In our clinic the classical caesarean section has been almost entirely replaced by the low cervical caesarean section. We favor it in the interest of safety to the mother. Technically it is probably a little more difficult but not markedly so.

We might ask what the factors of danger are in a caesarean section and why a low caesarean section is less dangerous than a classical caesarean section.

First, there is the question of the amniotic spill, which contaminates a much larger surface of peritoneum in a classical section than in a low section. As a result we have less peritoneal shock in a low cervical caesarean section.

No doubt an important factor in mortality is the question of uterine wound infection. The cervical wound can be better peritonealized than the fundal wound. If the cervical wound suppurates there is less likelihood of a peritonitis resulting.

As a rule there is less hemorrhage with a low cervical section since the operative field is further from the uterine placental sinuses.

During the performance of the low cervical section the intestines rarely come in view.

The postoperative convalescence is also more free from distension, ileus and peritonitis.

We do not like to go so far as to say that with the low cervical operation we can safely operate in the presence of infection after vaginal contamination. We still feel that the low caesarean section is safest in selected and clean cases. At the same time we cannot help but feel if a caesarean should be performed after some vaginal

manipulations the low caesarean section is by far the safer operation. But we do not dare praise it too much in this respect for fear it may be interpreted as meaning that we advise it in spite of the presence of infection.

We will demonstrate the technic of the operation. We have given this patient a spinal anesthetic of 150 milligrams of novocaine. No preliminary hypodermic has been given, because of a possible effect it might have on the baby. The bladder has been catheterized and the catheter has been left in the bladder. We have used both the Pfannenstiel and the mid-line suprapubic incision for this operation and find both equally satisfactory. After opening the abdomen we will place a large gauze pack in the abdomen to prevent to some extent abdominal contamination with the amniotic spill. We can feel the fetal head floating high above the pubes.

The uterine serosa is next incised transversely about one centimeter above the vesica uterine fold. The lower flap with the bladder is pushed well downward. As a rule there is no bleeding of consequence. The upper flap is next dissected upwards. We like to make this flap fairly thick by separating with it several layers of areolar tissue from the uterus.

Having dissected away the upper and lower flaps we have a diamond-shaped denuded area. A mid-line uterine incision is made in this denuded area and the uterus opened. The fetal head is so rotated as to bring the fetal face into the incision. The head is easily delivered manually or by forceps. Haste is unnecessary. We like next to strip the membranes away from the incision. We like to suture the lower end of the incision before attempting to remove the placenta as by thus delaying placental delivery we have less bleeding. The uterine wound is closed with two or three layers of catgut. Next the upper flap is pulled down and stitched to the lower uterine segment. Then the bladder flap is pulled up so as to overlap the upper flap. This finishes the operation. The tubes are easily accessible in case there is an indication for sterilization.

In conclusion we think the low cervical caesarean section should supplant in nearly all cases the classical caesarean section.

CLINIC CONDUCTED BY DR. W. K. REXFORD AT HARPER HOSPITAL FOR THE MEMBERS OF THE CLINICAL AND SURGICAL ASSOCIATION OF MASSACHUSETTS, MONDAY, APRIL 20, 1931

PROSTATIC HYPERTROPHY WITH VESICAL CALCULUS
(PRE-OPERATIVE AND POSTOPERATIVE CARE)

GENTLEMEN:—It is indeed a pleasure to meet so many doctors from so great a distance and I hope that we shall have something interesting to show you.

This case of prostatic hypertrophy is presented to bring out the preoperative and postoperative care of prostatics in the Urologic Department in this hospital and to call attention to the fact that these cases often wander about for some time without adequate examination.

History.—Male, aged sixty-six years. Chief complaint difficulty in urinating for the past six years. Frequency of urination every one to two hours day and night, urgency and burning, involuntary urination, sudden shutting off of the urinary stream. Was treated during the past December and January with bladder irrigation and prostatic massage, at no time having a urologic examination. In February had an acute scrotal condition requiring operation. This probably was a suppurative epididymitis as an epididymectomy was done. There is nothing of importance in the past history.

Physical examination is negative except for a moderate enlargement of the prostate.

A soft rubber catheter is passed easily, the residual urine being two and one-half ounces, very dirty.

Urine examination.—Reaction alkaline, trace of albumen, no sugar, numerous red and white blood-cells, no casts.

Blood examination.—Hemoglobin, 82 per cent.; red blood-cells, 4,520,000; white blood-cells, 9,100. Blood sugar, .083. Non-protein nitrogen, 30 milligrams. Blood Wassermann, negative. Phthalein appearance time, seven minutes. First fifteen minutes, 15 per cent.; second fifteen minutes, 15 per cent. Output for the first hour, 50

per cent. X-ray examination of urinary tract shows a large shadow of lime density high up on right side of bladder, suggesting possibility of calculus in diverticulum.

Cystoscopy, April 16, 1931, showed moderately enlarged right lateral and median lobes of the prostate and a large calculus, not in a diverticulum. No diverticulum was seen.

Intravenous pyelography showed no pathology in the kidneys or ureters.

April 22, 1931, suprapubic cystotomy. Calculus one and one-half by 4 centimeters removed. Prostate much enlarged intravesically. No diverticulum or growth found. Pezzer catheter for drainage.

The presence of a large vesical calculus in this patient complicates the situation somewhat, so that we feel this prostatectomy must be done in two stages, rather than as a one-stage operation with preliminary catheter drainage.

It has been the procedure here to drain our prostatectomy cases either by suprapubic cystotomy or with preliminary catheter drainage. Usually these cases are drained ten to fifteen days or until such time as their general condition and kidney function warrant proceeding with the enucleation of the gland.

In the Urologic Department of Harper Hospital during the past three or four years, approximately 60 to 75 per cent. of prostatectomies have been done as a one-stage operation with preliminary in-lying catheter drainage.

The procedure here has been to drain these cases until the blood nitrogen has come down to within normal limits. 35 milligrams is looked upon as a high normal limit, or has reached a constant level. When the nitrogen has dropped to normal, a phthalein test is done, the intravenous method being routine. Appearance time of five minutes is considered the outside limit and the phthalein is collected over fifteen-minute periods for one hour. It is felt that the first fifteen minutes should show the largest percentage of phthalein excretion. During the first fifteen minutes a normal kidney should put out approximately 1 per cent. per minute and it is felt that during the first fifteen minutes a phthalein output of from 20 to 30 per cent. is to be desired before going ahead with the prostatectomy. In those cases in which the output is larger in the

second or third fifteen-minute period, it is best that drainage should be continued until such time as the excretion for the first fifteen minutes has approached 20 to 25 per cent.

We have felt that estimating the phthalein for fifteen-minute periods during the first hour has given a better idea of what the kidney is doing and has increased the margin of safety in these cases.

It has seemed that some preliminary digitalization of these patients has aided in their postoperative course as so many of these men have severe myocardial changes.

Spinal anesthesia has been used almost exclusively during the past two to three years and has been very satisfactory. It gives wonderful relaxation and exposure and in the one-stage operation makes it comparatively easy to suture the capsule and control bleeding points requiring much less dependence upon the hemostatic bag, which is used routinely, in all of these cases.

It has been almost routine to give these patients subcutaneous saline on return from the operating room, 1000 cubic centimeters, and repeat in six hours and if fluids cannot be taken satisfactorily by mouth, a third infusion may be given at the end of another six hours. It is felt that the fluid intake of approximately 3000 cubic centimeters over twenty-four hours is to be desired in these cases and if that amount cannot be taken by mouth, after the first twenty-four hours, the balance can readily be made up by additional subcutaneous infusions of normal saline.

The hemostatic bag is usually removed at the end of twenty-four hours, occasionally being left in for an additional twenty-four hours before its removal. A suprapubic drain is left in place for a week or ten days at which time an in-lying catheter is substituted which seems to materially shorten the time required for the suprapubic sinus.

It is felt that these old gentlemen do much better when gotten out of bed as soon as possible following prostatectomy and every effort is made to have them out in a wheel chair by the fifth or sixth day if possible, and, weather permitting, the following week an effort is made to get them out onto the sun porch a short time each day.

This, in brief, has been the method of preparation and post-operative treatment of these cases. It seems that there has been a

marked decrease in postoperative renal insufficiency. Epididymitis is not infrequent but may be prevented by early vas section. Infection of the prevesical space may be avoided by doing a high cystotomy and keeping out of the prevesical space. Postoperative kidney infection, pyelonephritis, we have, but meticulous care in the handling of drains and in-lying catheters will tend to minimize them.

BILATERAL RENAL LITHIASIS

History.—Male, aged twenty-eight years of age, colored. Patient first seen in the Out-Patient Department of this hospital in March, 1929, complaining of pain in the right lower back, preceding eight weeks; colicky pain beginning in right loin, radiating to right groin and perineum. No history of hematuria.

Past history negative except for gonorrheal infection and an appendectomy some three or four years prior to appearance in this clinic for chronic appendicitis.

Urine negative except for a few red blood-cells. Blood nitrogen 30 milligrams. Blood Wassermann negative. X-ray examination showed a shadow of lime density in the region of lower right ureter. Patient had numerous cystoscopies in an effort to dislodge calculus in lower right ureter. Cystoscopy, December, 1929, showed indigo-carmin appearance on the left, four minutes. A trace on the right, ten minutes. Catheter could be passed up the right ureter about 2 to 3 centimeters and was obstructed. Operation advised.

Right ureterotomy was done January 9, 1930.

Cystoscopy before discharge showed indigo-carmin appearance time on the right four minutes. Pyelogram showed enormous dilatation of right ureter and right kidney pelvis and marked blunting of the calices. Patient reappeared in the clinic in December, 1930. History of right-sided colic and passage of several stones. X-ray examination showed shadows of lime density, in the area of left kidney. None in the right. Urine negative. Blood nitrogen, 29 milligrams. Cystoscopy showed function of both kidneys to be good. Indigo-carmin appearance, four minutes on both sides in high concentration. Pyelogram, shadows in left kidney area obscured by pyelographic medium. February 24, 1931, two stones removed from the left kidney through nephrotomy incision owing to the fact

Fig. 1.

Calculus in lower right ureter. Faint trace of indigo-carmin at end of ten minutes.

FIG. 2.

Calculi in left kidney ten months after removal of calculus from lower right ureter.

Fig. 3
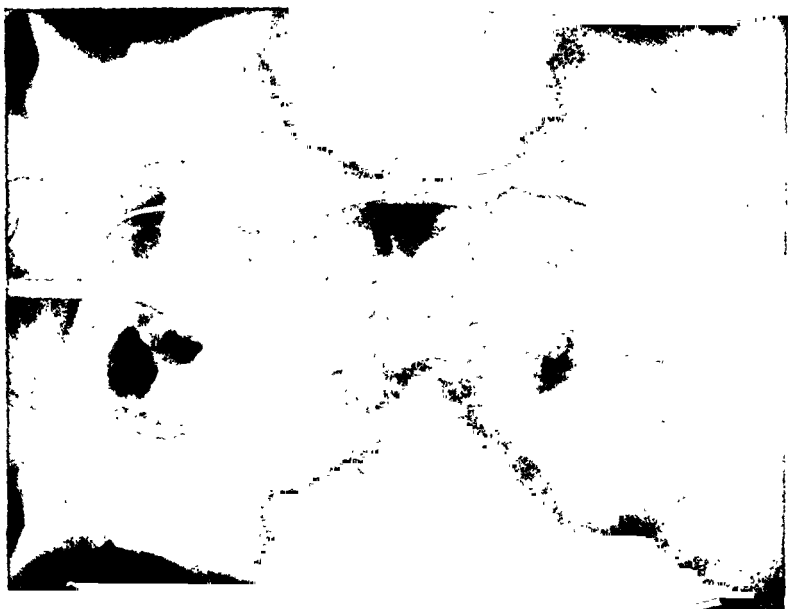
Pyelo-ureterogram three weeks after removal of obstructing calculus from lower right ureter.

Fig. 4

Pyelo-ureterogram fourteen months following removal of obstructing calculus from lower right ureter. Note improvement in calices following free drainage as result of removal of calculus.

that there was a very small intrarenal pelvis. Patient discharged March 15, 1931.

Patient was re-admitted April 14, 1931, with a history of three attacks of right-sided colic with passage of several small phosphatic stones. Cystoscopic examination, April 15, 1931. Indigo-carmin appearance time on the right, five and a half minutes. Left, five minutes, both with high intensity. Left kidney, occasional red cell and occasional white cell per high-power field. Findings the same on the right. X-ray examination shows shadow of low lime density in the region of the left kidney pelvis and shadow of low lime density in the region of the lower calix of the right kidney.

This case is particularly interesting for the following reasons:

(1) After removal of a single right ureteral calculus, (Fig. 1) the rapid formation of calculi in the previously unaffected kidney (Fig. 2) and also in the kidney first affected.

(2) Marked restoration of function after the removal of the obstructing ureteral calculus.

(3) The marked improvement in the outline of pelvis and calices of the kidney which was severely damaged by the obstructing calculus. (Figs. 3 and 4.)

(4) The problem of the future management of the case.

Our present plan is to drain the right kidney through a nephrostomy tube over some little period of time and wash out the kidney pelvis daily in the hopes that it will clear up such infection as is present and prevent the further formation of stones in this kidney. In addition we will dilate the lower ureter to promote the best possible drainage.

Later we plan to repeat the procedure on the opposite side.

Medical Questionnaires

Collated by BICKEL, M.D.

Washington, D. C.

What made industrial atmospheric impurities fatal in Belgium?

Last winter, hundreds of people became ill and sixty-three of them died in the industrial section near Lüttich while a dense fog prevailed over the River Maass. The air in that neighborhood always contains sulphur dioxid and hydrogen fluorid. Because of the acrid soil, agriculture and cattle breeding have not been successful. Hills shut in the industrial district. At the time of the fog the cold air in the valley did not rise, and the atmosphere evidently had reached an intolerable saturation with chemicals. Patients habitually suffering from asthma and bronchitis, and the older people, were the easiest prey to the nasal, oral, pharyngeal, tracheal, and bronchial irritation. In the city of Lüttich no such illness was reported, although fog was dense there. The patients complained of dyspnea; the pulse was rapid, 40 per minute; they coughed; in severe cases, dyspnea was serious and associated with cyanosis. Grave cases showed symptoms of pneumonia. The patients died within twenty-four hours. At autopsy, the mucous membranes were found reddened and swollen down to the bronchial branches, and the hearts were dilated. Patients who were at home in their beds fell ill and died, though the fog had not entered. Adrenalin injections and tonics brought temporary relief. Zinc sulphate and other chemical factories are densely distributed over the area. Haldane warns that the English fogs may some time bring about similar atmospheric poisoning. The warm air over a large city like London would carry the fog above the danger-line for inhalation of such gases, as those from sulphur acids. The first is contained in the air in small droplets, the latter in the form of gas. Haldane does not believe that hydrofluoric acid was the damaging chemical at Lüttich. Trillat, Lesieur and others have insisted that germs of respiratory diseases

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adhere and are absorbed more readily when the atmosphere is foggy. Guyon and Grootten, however, have found in their experiments that there are ten times as many germs on fogless than on rainy days.

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Has headway been made in the treatment of multiple sclerosis?

The work of Chewassut and Purves-Stewart in England has had considerable attention. Purves-Stewart used his vaccine at first on 128 cases of multiple sclerosis with the result that the serum of some of his patients acquired bactericidal properties. Symptoms subsided, or remained stationary, and the microorganisms disappeared from the cerebrospinal fluid. Both the goldsol and the albumin curve were reduced. Considering the hopelessness of therapeutics in this field, even the fact that repetition of the treatment was necessary in many cases makes the results encouraging. Shuster found spirochetes in syphilitic multiple sclerosis in the marrow near the cortex, and also in genuine multiple sclerosis spirochetes were demonstrated. In other instances, such microorganisms could not be detected, except in gold stains; the subvisible granules were not found in silver-stained specimens. It must be remembered that spirochetes are not often found in the cerebrospinal fluid of paralytics, which fact points to subvisible forms.—According to Chewassut the cultivable ultravirus, which was highly specific, contained a pathologic agent smaller than bacteria of peripneumonia of cows. The patches in the marrow in multiple sclerosis which cause the functional default have a histopathologic reaction entirely typical of multiple sclerosis. Chewassut believes that all types of this disease have their origin in the same cause, ultimately bacterial. She noted increase of albumin in the cerebrospinal fluid in 40 per cent. of the cases, and the positive goldsol reaction in 77 per cent. Cultures show groups of small spherical colonies, to some of which small granules adhere after twenty-four to thirty-six hours at 37° C. Evidently, a living filtrable virus exists.

Hicks and Hocking state that Chewassut's recent refusal to demonstrate the spherules to the Medical Research Council, which caused Sir Purves-Stewart to dissociate himself from her, does not indicate the non-existence of these spherules. These two authors have found them in their own independent studies.—Schuster attempts to show that no relation exists between the spherulae insularis described by the two English investigators and the virus form of spirochetes. He is searching different strains of virus.—Much work has been done in connection with war veterans' cases in an attempt to settle pension claims. It is not possible to determine whether former attacks of multiple sclerosis have occurred in cases where the first was observed during the war. Stern considers multiple sclerosis not traumatic in the general sense, though Reichardt believes that traumatism to the spinal cord may prepare the soil. Marburg gives 9 per cent. as due to trauma. Jolly could not detect the influence of trauma in thirty soldiers' studied. He states that a number of cases have been diagnosed erroneously as multiple sclerosis where carbon-monoxide poisoning or electric high tension damage was present.—An exogenous influence from a living virus is accepted by many, but neither time of incubation nor the nature are definitely known in most clinicians' opinion. Steiner believes in a protracted latency. The age of onset is quite generally agreed as being the second decade.—Weve thinks that careful examination of the internal ear may disclose beginning multiple sclerosis. He saw one case where atrophic ocular symptoms were the first to attract attention. There was a so-called retrobulbar neuritis of the optic nerve with vestibular symptoms upon caloric and galvanic testing. Laryngologic investigation alone might have led to operation. Deafness is not common in multiple sclerosis, but 10 per cent. of patients hear noises. Labyrinthine symptoms were found in 96 per cent. of forty-eight examined by Barré en Reys.—The main therapeutic method in common use is rest and avoidance of fatigue. Malaria has been advocated by Dreyfus and Hanau, typhoid vaccine by MacBride and Carmichael, and by others. Boveri has administered Pettit's antipoliomyelitis serum. Arsenic has been given, and many other remedies have been tried.

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What practical use is made of contact glasses?

For some years correctional glass dishes have been worn under the eyelid instead of lenses, placed in front of the eye, by actors whose vision was inadequate for stage performance, and who could not wear spectacles for their work. The more directly therapeutic use of these contact glasses has been for keratoconus, mainly. It is just recently that these glasses of the future, as some enthusiasts call them, have been perfected. Herschel proposed contact glasses one hundred years ago. Fick made experiments upon himself and animals in 1888, using a 2 per cent. grape-sugar solution in the space intervening between the eye and the glass. He improved vision in irregular astigmatism from corneal plaques from one-thirtieth to one-sixth. August Müller used them for shortsighted eyes in 1889. He also employed them in deficient closure of the eyelid. Some patients tolerated the glasses for a few hours at a time only, but one patient wore them for twenty-one years without difficulty. In 1916, Sattler corrected a conical cornea by the wearing of these contact glasses during the day. Now he prescribes them for keratoconus, severe astigmatism, and high-grade myopia. Strebel calls the treatment of keratoconus in this manner orthopedic. It strengthens the scar formation and flattening, which results in a natural restoration. If lachrymation becomes troublesome the glass is removed, and a drop of novocain solution is put in the eye at night. The eye is swabbed with borated vaselin, olive oil, or liquid paraffin.—Strebel has been successful in changing the corneal radius and increasing the central

refraction. That the improvement was not accidental was shown in a patient who would consent to treatment of one eye only. While the treated one improved the other grew progressively worse.—Rosengren recently employed a prothetic lead glass, such as is used in roentgen examinations, for holding corneal grafts in place; the healing process could be watched through it.—Two main types of contact glasses have been on the market, the blown and the ground. Only a small number of each had been available until recently. Many sizes and shapes are necessary to be successful. The posterior surface of the dish does not touch the anterior surface of the eyeball everywhere, for in the short-sighted eye, for instance, the glass cornea touches the patient's cornea only in the center. The surrounding area is filled with physiologic saline. Correct relation of optic and haptic portions is indispensable. Too great a convexity of the scleral portion might produce constriction of the conjunctiva, or compression of the cornea, opacity and pain. Both optic and scleral radius must be taken into consideration. The optic portion, in a very concave dish, is flatter, and lies upon the center of the cornea, or even compresses it. Such conditions render the normal eye shortsighted, in the first instance, and hyperopic in the second.

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Can diet replace monkey glands?

Lorand, in a lecture held at the Huntarian Society, thinks so. One often observes early ageing in persons suffering from lack of hydrochloric acid in the stomach, from anemia, or insufficient function of the thyroid gland. Anemia is apt to be associated with old age, and achylia and anemia are possibly the result of thyroid degeneration, or of intestinal intoxication. High blood-pressure and arteriosclerosis frequently result from toxic intestinal products. To improve such conditions, Lorand thinks, the hormones and salts

should be increased and intestinal auto-intoxication should be prevented. The peripheral circulation must be stimulated by way of the endocrine glands, which should be treated with ultraviolet rays. Spinach stimulates the production of hydrochloric acid. Meats and fats are to be avoided. Meat causes most, and casein least, putrefaction. Butter and olive oil, potatoes, steamed rice, bananas, fresh cottage cheese, and, first of all, eggs should be included in the diet of those beginning to age.—Eugen Steinach is vivid and full of plans on his seventieth birthday; he continues his experiments on animal gland transplantation and extracts made from them. From his methods of rejuvenation he has gained many transient and quite a number of lasting results.

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Is preventive inoculation for measles ready for practical use?

Physicians and public-health workers agree on the value of convalescent measles serum for prevention and treatment. The reason why it has not been used oftener, according to Bauer, is the difficulty of procuring serum when required. The epidemics occur periodically, at from twenty-four- to thirty-month intervals. At the height of the epidemic ample serum can be obtained. It would, however, be more useful at the onset. The serum does not keep very long.—In Japan, Kusuma and Ito have been experimenting with cultures of the measles diplococcus. Kusuma suggests that the measles germ belongs to the pseudodiphtheriae bacillus group. The growth is bacillary in liquid media, and becomes coccoid when transplanted.—Kusuma administered 1.0 cubic centimeters measles coccobacillus vaccine to 137 children who had no history of measles. The disease developed in seventy of them. Of 195 children who did not receive vaccine, 189 developed measles. The vaccine has some protective properties.

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In how far are floating bodies in the vitreous alarming?

Shadows thrown on the retina by objects in the transparent media of the eye cause subjective observation of floating bodies. They need not be opaque to throw shadows. If they are not, they may appear luminous with a dark border, if they have a higher refractive index than the medium; if lower, they have a dark center and luminous edges. They may come from the cornea, lens, vitreous, or retina. There are many forms. Samuels gives a clear distinction of physiologic and pathologic floating opacities. They may be seen in the ophthalmoscope, yet may not be found in microscopic sections. —Brewerton advises examination with simple means rather than with the slit lamp.—Most patients complaining of entopic shadows have strands in the vitreous. If they appear suddenly, and have been preceded by flashes of light, something must have happened to the eye. If the floating bodies are sharply defined when looking at the sky, and the vitreous appears transparent, they may be disregarded. Vessels of the retina may appear as dark branching streaks on a red field. They may point to early or advanced macular changes. A dark spot coming on with the systole of the heart may be seen in certain light, and under pressure. Air bubbles on the corneal surface are seen with the lids nearly closed, through a pinhole opening like bright, minute beads moving slowly upon winking. The moisture on the lid margin acts as a prism under these circumstances. Coloboma produces similar conditions. Color rings usually originate from the cornea, and are transient when due to mucus on the cornea; they are permanent in some cases, and are always present in glaucoma, if the cornea is hazy. Most patients with mucopurulent conjunctivitis see rainbow rings around the light upon awakening from deep sleep. Washing the eyes will remove them. In certain injuries the vitreous body may be separated from the retina by albuminous fluid containing cells. The stroma becomes uniformly infiltrated with lymphocytes, and later pus may form. Red blood-corpuscles, or pigmented epithelial cells, or granules may reach the vitreous body. Blood-vessels derived from the ciliary body, retina, or optic nerve may protrude into the vitreous. Products of degeneration, such as cholesterol crystals, are permanent. Many of the sub-

stances causing the entopic phenomena disappear spontaneously, so that it has often been hard to gauge the effect of the treatment given.

BREWERTON, ELMORE W.: "Entopic Phenomena," *Proc. Roy. Soc. Med.*, *October 10, 1930*, vol. 24, p. 45, November, 1930.
SAMUELS, BERNARD: "Opacities of the Vitreous," *Arch. of Ophth.*, vol. 4, pp. 838–857, 1930.

Should arch supports be prescribed for flat feet of children?

Spitzy says, no. He points out that in early childhood the foot is normally flat, and that the imprint, on account of the abundance of fatty tissue, further increases the impression of its being so. Generally, the bones are in a normal position. When the child first begins to walk, the arch caves a little, but that stops later. Only a few of the new-born infants have a definite pes valgus, which is not only flat, but turns out upon pronating the calcaneus. It results from intra-uterine position of the dorsum of the foot which was bent back against the tibia, with subsequent increase of dorsal flexion. The calcaneus deviates outward, and the arch is forced through. It is often seen in cases where the other is a club foot. A tendency of the axis to deviate inward at the ankle is not uncommon, however. The feet of most children can be trained, not by arch supports, but by placing a small plaster-of-Paris button under the arch. The children are told to walk on their toes temporarily, if the pressure should cause pain. Soon they learn to arch their feet, and the training will suffice to overcome the tendency to flat foot.

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What do recent studies on tuberculosis suggest to the practitioner?

The avalanche of tuberculosis literature has caused much confusion. The initial infiltration has found much publicity, but it is not clearly understood. For many years radiodiagnosis has put stress upon hematogenous infraclavicular shadows, which lead to rapid degeneration in certain forms of phthisis. These "pre-phthisic" shadows have been diligently sought. However, these shadows vary as they may be due to bronchial emboli from cough metastases in the lobar border, or to the so-called Assmann foci. Those not located

in the periphery are probably due to collateral inflammation around older fibrous foci, similar to those seen in congestive tuberculous conditions, or to epituberculosis, or splenopneumonia. Other early forms are perihilar or peritracheal infiltrations, which are more common in children who live with actively tuberculous patients. Often they are found in those presented for eczematous conjunctivitis.— In some instances, these infiltrations break down in a few weeks or months, that is, before the first tubercle bacilli appear in the sputum, or they disappear partially or completely. Rapid degeneration is seen in some wedge-shaped early infiltrations associated with high temperatures and influenza-like general conditions, while the spherical shadows do not form cavities and are later absorbed.—It is necessary to correlate the constitutional features and the general course of the disease with radiologic findings.—Behring believes that phthisis is generally the result of a second infection in the adult following a first, contracted in childhood, and that this partial immunity restricts it to the lungs. Many writers, however, consider it a continuation of the primary infantile infection. Ranke described three stages of tuberculosis. In the first, a primary focus develops, with caseous pneumonia in the center and caseous tuberculous granulation at the periphery. He found a chain of gray caseous tuberculous nodes issuing from them to the lymphatic glands at the root of the lung. It may extend to the mediastinum and the subpleural lymphatic vessels. The primary infection may heal, the granulations become scars; the caseous matter may calcify. The same changes go on in the lymphatic glands. There is a primary allergy. In other cases, hypersensitiveness develops and the tuberculosis becomes generalized. The tuberculous virus may develop a secondary stage with exudative features, and metastases in bones or joints, or elsewhere in the system. Where a relative immunity develops no further metastases are produced. The tuberculous foci enter into the productive stage. The tertiary relative immunity is manifested by productive cirrhosis. Consumption may result from any of the three stages, according to Ranke. Aschoff does not consider the primary and secondary stages as the juvenile, and the tertiary as the adult form, as do many writers. He assumes a re-infection for the progressive phthisis of the adult.—Bogendörfer is inclined to consider the primary tuberculosis a children's disease, and believes that every child becomes

infected with tubercle bacillus. In civilized countries, if it has once gone through the infection in youth, no new invasion occurs. Calcification or encapsulation of the parts primarily infected takes place, leaving a certain number of bacilli viable, or the pulmonary focus heals and the infectious matter stays in the glands, or a generalization from the primary focus results. Small recent lesions have a tendency to generalization, according to Hübschmann.—The pathologic conceptions lead therapeutics. Most of the apical cases, reaching the practitioner, are latent and past the primary stage. If the patient is in the primary stage he should receive immediate treatment.—Hematologic, bacteriologic, and roentgenologic examination should be made periodically of those born into, or living in tuberculous surroundings. Practically all children come in contact with tuberculous individuals.—The fact that marriage partners of actively tuberculous patients contract tuberculosis in only from 6 to 12 per cent. and doctors and nurses, living with such patients, rarely contract it, does not minimize the responsibility of discovering and treating all primary early cases. Both lymphatic and blood circulation are used for propagating the infection.—Braeuning describes the acute hematogenous intrapulmonary dissemination as not so common in adults as it is during the early primary stage, yet more common than generally supposed. The infiltrations occurring when regression of hematogenous dissemination begins are about the hilus, which differs from the acute, severe types. Caverns forming at this time are often overlooked. Acute hematogenous dissemination is often accompanied by pleuritis. The acute form generally runs its course unrecognized. Symptoms are scarce, though the blood sedimentation and, generally, the white blood-picture are changed. Only a few bacilli are found in the sputum. Most of these patients have been exposed to superinfection in childhood, or still live among tuberculous persons. The condition is apt to become serious about puberty.—Fischel considers the non-apical infiltration the late benign form of phthisis, and the apical lesions progressive.— Löwenstein states that tuberculosis bacilli may reach the blood-stream at any stage of the disease. The primary pulmonary focus is not always the source of the blood infection. Löwenstein is convinced that the bacillemia is present before the tuberculin reaction becomes positive. Sensitiveness to tuberculin is present only

where there are living tubercle bacilli. The visible anatomic lesions develop later. In patients with caverns one may not find bacilli in the sputum, though they may be found in the blood.—Löwenstein points out that tubercle bacillemia has been found in acute polyarthritis, rheumatic chorea, spinal meningitis and other conditions.—Various nondescript conditions bring the infected children to the doctor. Gastro-enteritis, capillary bronchitis, teething, grippe, slight febril colds, indicate the distribution in the system.—Henri warns that tonsillectomy in those exposed to tuberculous infection may cause a dissemination of the disease in the system.—The prognosis for tuberculous infants cannot be judged with a plain formula. Delay of infection while exposed to it is inversely proportional to the severity of the case. If the antiallergic period, after removal from the danger, is more than five weeks, Lelong pronounces the prognosis favorable.

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Staub, Hans: "Zur Phthisiogenese und zum tuberkulösen Frühinfiltrat," *Schweiz. med. Wchnschr.,* vol. 66, pp. 157–161, 1931.

Is cancer transmitted to others by contact or heredity?

Life-insurance statistics do not agree on the subject of heredity. Animal experiment points to hereditary predisposition, varying with the strain which was inoculated. In some houses, cancer seems to be prevalent among the inhabitants. In families, observations are not sufficiently exact to draw conclusions. Ewald considers contagiousness so far unproven. Bashford found cancer in 10 per cent. of the total population over forty years of age. Hoffmann could not draw the conclusion of heredity of cancer from his statistics compiled for several countries. Bauer believes that statistics are not the means of answering this question. The autopsies made at a German pathologic institute disclosed cancer incorrectly diagnosed in 32 per cent. for the internal organs. A racial propensity is suggested in Great Britain by the figures for women who suffer from cancer; deaths, there, are considerably higher for mammary carcinoma than in Italian women. The same obtained in the United States of America for women of English and of Italian extraction. Racial and living conditions evidently enter into the problem.—Bauer finds an undeniable predisposition for cancer, which has been proven hereditary by human pathology and experimental biologic research, and more especially for cancer of certain organs or tissues. Not only is this a constitutional organic predisposition but also a general predisposition for blastoma. He finds the prospects unfavorable if both parents have the same type of cancer; if they have different types of cancer, prospects are better. Exogenic etiologic factors produce the same effect on selective organs or tissues in the same family.—Sternberg, with many other pathologists, pronounces cancer a non-infectious disease. There are no specific pathologic micro-organisms for cancer. Parasites of all types have no etiologic significance for malignant tumors, and constitute only damaging conditions such as do chemical, thermal and physical influences, according to Sternberg. Metastatic tumors, which have been widely drawn into

the investigation, consist of tumor cells which have migrated, and the cells of the organ on which they grow do not participate.—The present general trend toward constitutional etiology has prompted an attempt to outline types most prone to develop cancer, for possible preventive aid. Voltz believes to have found a distinct predisposition of red-haired persons for cancer.

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What therapeutic results have been gained from research on hormones?

A vast amount of research has been done on hormones in recent years. Although some clinicians have used certain hormonal preparations for a long time, for instance Köhler, who claims thirteen years' therapeutic use of hormonal extracts in gynecology, many of the preparations have still but a purely experimental and scientific significance. A questionnaire sent to dermatologists in Germany recently shows that only a small number of those asked had employed these remedies, haltingly and rarely. Quite a number of them considered them in the experimental stage, partly because of the pharmacologic difficulties and immaturity of the problem of dosing them correctly. Some of the earlier preparations were practically nonspecific. Some of the older results were due to albumin bodies, proteinogenetic amines, cholin and other substances. Köhler points out that if hormone extracts are specific they should have an effect both on over- and under-function. The dose is chosen with regard to whether there is an over-function, or a lack of it. In gynecologic practice they have been employed in amenorrhea, polymenorrhea, for establishing menses at puberty; for treating difficulties of the menopause, and reactivation of the sex functions at that time. Good results have been achieved in hypoplasia or infantilism, and hemorrhage from displacement of the uterus, the latter pointing to a

transient mechanical effect. Prolan has been used to overcome lack of function of the pituitary gland. Other pituitary hormones of the anterior lobe have claimed success in menstrual difficulties at puberty. Progynon is one of the numerous preparations used in amenorrhea. It is derived from the urine of pregnant women. A serum prepared from that of pregnant women seems to have a most logical effect upon development of prematurely born infants, reports Nölle.—Among the dermatologists Winkler had some experience with hormonal extracts. He had used it with good results in diabetic dermatosis and non-diabetic xanthoma, in furunculosis, pemphigus, and psoriasis. Hormonal ointments have been put on the market, and have been employed with varying results for burns. Thyroid glandular hormones have claimed good results in circumscribed edema and seborrheic eczema of infants. Unna used it and adrenalin in urticaria and lichen, also for burns. Milian recommends it for angioneurotic conditions following the use of salvarsan. Almquist has used it for mercury dermatitis. Though many of the dermatologists consider the pituitary extracts incompletely developed, and uncertain in their action, a number of gynecologists claim a scientific therapeutic effect.—Much of the difficulty in practical application of the hormonal extracts arises from the incompleted studies on the hormones. Just recently many new facts have been found regarding the constituents of the various parts of the pituitary gland, and the sex hormones. Not all cell products are hormones; they may be toxic refuse products or may be parts in a nutritional system. Chemical methods are inadequate in demonstrating hormones, excepting, perhaps, in adrenalin. The best understood are thyroxin, adrenalin, insulin and parathyroidin.—There are generalized and individual hormones. In studying the sex hormones of women for diagnostic purposes several, two, or by others, three, have been found. The theory of a single sex hormone from an endocrine standpoint of the gestational gland is being abandoned. Follicle, corpus luteum, and placenta have their own specific functions.

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Is a distinction of somatic and psychologic therapy warranted?

Goldstein warns that medical science and medical practice are in danger of dropping apart. The practitioner must often decide upon physical, or mental treatment. Some practitioners treat the patient's physical ills, and let the psychoanalyst do his work at the same time. Some analysts believe one should give the patient no somatic treatment while he is doing his special work.—For Ostwald no duality of person exists. He cannot conceive of psychology outside the confines of biology. Non-psychiatric physicians are apt to forget that individuals are such because they differ one from the other.—Each one requires his own evaluation and treatment. Each reacts in his own way to surroundings and to treatment.—The chromosome is the carrier of heredity, and in it are contained the various distinguishing hereditary factors. In each individual chemical energy of metabolism is transformed into mental energy in a specific different manner, and the physical and mental reactions are individual. Reaction to changes in environment vary in different types, at least, and even in the individuals. This is clearly shown in diseases and in tolerance of tropical climates.—Changing radioactive charging of the atmosphere influences the body. Epileptics are influenced, notoriously, by certain atmospheric conditions. Kindlimann in Switzerland has collected statistics on the occurrence of paralytic strokes under certain atmospheric conditions. He also points to periodicity

of epidemics in connection with climatic constellations.—Again, asthma will often subside after emotional causes are removed. The leptosome type is easily fatigued both physically and mentally; the pyknic is energetic and mentally alert.—Bergson developed a biologic psychology and a biologic psychopathology. Much therapeutic disappointment is avoided wherever the constitutional and environmental makeup of the patient is taken into consideration, and if a patient psychologic understanding is acquired.

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SCHARFF, WALTER: "Ueber die Wirkung wenig beachteter Naturkräfte auf den Menschen," *Der Nervenarzt*, vol. 4, pp. 34–36, 1931.

How does the general practitioner manage the mouth diseases?

The general practitioner recommends the dentist wherever he can. Immediate demand for dental aid by the family physician may arise, and there are many oral border-line conditions which he may prefer to manage himself, as they fall in his precinct.—Inflammation of the oral mucous membrane is very common. Wolf found it in sixty of ninety-six unselected patients at the internal diseases clinic of the Charité at Berlin. Marginal gingivitis may start in one tooth and involve several neighbors, or corresponding teeth in the opposite jaw. It starts between the teeth with swelling and reddening of the gingival papillae. The epithelium bleeds. Mastication is painful. The calcareous deposit around the teeth must be completely removed and overlapping sharp edges smoothed. The gums are swabbed with cotton saturated in hydrogen peroxide, and touched with zinc chloride solution. A slightly astringent mouthwash and soft tooth brush are recommended. Patients have to be taught carefully how to rinse their mouths. They should be entirely filled with water, and the fluid moved up and down vigorously for a minute. Teach patients that small quantities of rinsing fluid lack the mechanical cleansing effect.—During pregnancy and menstruation hypertrophy of the gums is common. It is probably an early symp-

tom of paradontosis. The gingival papillae are swollen, bleed easily, and often granulations are detected beneath the gums. The condition is evidently due to endocrine and metabolistic disturbances. A thin solution of sulphurated acid is injected into the gum pockets. The calcareous deposits are often hardly discernible.—Atrophic gingivitis is quite painful, as the dental neck becomes bared.—Ulcerative stomatitis, with involvement of tongue and cheeks, is considered epidemic by many. Dentists are prone, of late, to attribute it to closer relation of the sexes. Whether that would make it a recent complaint is doubtful.—Peroxide is an excellent remedy in many of the mouth diseases as it cleans crevices effectively.—Most cases of gingivitis are referred to the dentist, except in an emergency.—The diseases of the tongue, however, are the field of the practitioner. This organ used to receive more attention by the doctors than it does in a time of predominating laboratory interests.—The tongue is coated in dyspepsia, gastric ulcer, nephritis, phthisis, cachexia, and in fasting persons. Often inactivity of the digestive tract causes it, although no serious general pathologic state is present. Here mouth washes are not often lastingly effective.—Slight inflammation is encountered in iodism, bismuthism, or from copper, gold, or from silver, causing the so-called argyroma. There is an occupational metal intoxication which industrial physicians often find. The raspberry tongue of scarlet fever, the discoloration of measles and the membranes of diphtheria are, too, well known.—Ulcerative stomatitis is apt to involve the tongue, especially the borders and the tip. Hydrogen swabbing and mouth wash, 60:100 are useful, and pyoktannin, still better, local dusting with it, or intravenous injection of neosalvarsan.—Lingual phlegmona or abscess are easily recognized by the changes in the mid line, and hardening at the base, unless they are deeply imbedded in the muscular tissue. Ludovici's angina may develop or other adjacent parts may become involved. One must guard against too early incision. When the ulcer has formed, incision from the mouth, or from the outside, is indicated.—The etiology of the black (hair) tongue is still unknown. It is generally harmless and may be scraped.—Möller's glossitis is chronic and situated on the back of the tongue and its borders, with a red stripe through the middle. It may be swabbed with lactic acid and silver nitrate, and a tannin mouthwash recommended.—The geographic

tongue in children with its somewhat salient red patches is now considered scrofulous. A ½ per cent. salicyl or 2 to 5 per cent. resorcin or a hydrogen solution may be applied. Milk sugar alleviates the pain.—The gonorrheal mouth infection in children is marked by reddening and swelling of the tongue, gums, and cheeks. All are coated and there is epithelial desquamation. For it silver preparations are used very cautiously.—Soar is treated with boric and potassium permanganate solutions, as washes, or bicarbonate powders are employed. The tongue, in these instances, should not be scraped.—Actinomycosis is either tumor-forming or ulcerating. The focus of infection must be removed by electrocauter, diathermy or excision. The conservative treatment recommended is roentgen radiation, iodine, or arsenic intravenously.—Syphilis may become lingual in any of the three stages. The treatment is specific. Tuberculosis of the tongue has a tendency to fibrous scars, and proliferation. There may be a single tubercle, or a tuberculous ulcer on the border. It is a grave condition. The treatment is general. Electrocautery, may be employed. Lingual traumatism deals mainly with control of hemorrhage. The patient must be kept very quiet. Clamps must be applied to the entire thickness of the organ.

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Ourselves

The last, present, and next volumes of the International Clinics
By Henry W. Cattell, A.M., M.D.,

One-tenth of the INTERNATIONAL CLINICS for March was taken
up by two of Professor Barker's inimitable clinical lectures on the
new, revolutionary studies of the etiology and therapy of multiple
sclerosis and on a form of rickets occurring in sporadic cretinism.
There then followed articles on our newer concepts of calcium metab-
olism and the clinical interpretations of the biochemical findings
of carbohydrate metabolism, with which the names of Collip and
Banting will always be associated. It will be remembered that both
Banting and his co-worker, Collip, published their earliest clinical
papers in the pages of the CLINICS. The Medical Department of
Emory University, Atlanta, Georgia, was selected for a series of
thirteen practical, clinical papers emanating from this source. Dr.
Donald C. Balfour, of the Mayo Clinic, devoted thirty-six pages to
the progress of surgery and there were prepared, chiefly from foreign
sources, much valuable data in medicine and its specialties, such as
obstetrics and paediatrics, pertaining to diagnosis and treatment of
many of the commoner diseases, the index showing over forty refer-
ences under the head of treatment to as many different affections.

In the present number there are 33 papers and 96 illustrations,
one of which is in color, from such widely separated medical centers
as New Orleans, Louisiana, and Detroit, Michigan. But this volume
lies before you, and speaks for itself. Read it, please!

The next issue (September, 1931) of the INTERNATIONAL CLINICS
will be a Barker *Festschrift* in honor of the sixty-fourth birthday
of Professor Lewellys F. Barker, of Johns Hopkins Hospital, Balti-
more, and it will show a wide geographic distribution of writers and
a diversity of medical subjects treated from their clinical aspects.
Of some thirty persons asked to contribute papers, over twenty
have already sent in their titles upon which they will write or as in
the case of Dr. Henry A. Christian, of the Peter Bent Brigham Hos-
pital, of Boston, and Theobold Smith, director of animal pathology of
the Rockefeller Institute of Princeton, New Jersey, their manuscripts
have already gone to the printer to be put into type.

CUMULATIVE INDEX

(FORTY-FIRST SERIES—1931)

(Where Roman figures are used, i refers to Volume I (March, 1931) and ii, to Volume II (June), while the Arabic figures denote the page in which the first reference to the subject will be found.)

1900   1930

TYPHOID FEVER

ENTERITIS,
under 2 years

DIPTHERIA

MEASLES, S.F. &

POPULATION	1,293,697
DEATHS	26,975

1900

POPULATION	1,954,063
DEATHS	24,541

'30

	1900	1930
MORTALITY RATE per 1000	20.9	12.56

1900	1930

Graphic comparison of the mortality rates for Philadelphia during the years 1900 and 1930.